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FILE

1997

CAPE COD 1997 REGIONAL TRANSPORTATION PLAN

CAPE COD COMMISSION
Transportation Staff

Endorsed March 28, 1997

Prepared in cooperation with the Massachusetts Executive Office of Transportation & Construction, the Massachusetts Highway Department, Massachusetts Department of Environmental Protection, and the United States Department of Transportation - Federal Highway Administration, Federal Transit Administration



Certain pages may have been omitted during printing and are
included in this special insert.

Projects Analysis

2

RTP# 1005

Nickerson Park Access from Route 6

Description Brewster - Direct access via new interchange to Nickerson Park from Route 6

Score

n/a

Project I.D.

Annual Cost

RTP Projected Cost

Upfront Cost \$15,000,000

\$15,000,000

Goal Compatibility Analysis

goal 1

goal 2

goal 3

goal 4

goal 5

Compatibility

Insufficient information - compatibility not determined at this time

Benefits Analysis

Travel Miles 11.6

Travel Hours 19.0

Safety

Air Quality 29.3

Systems Mgmt 50.0

Infrastructure

Environment

Mode Shift

Access Mgmt

Benefit Level 109.9

VMT Reduction 302

VHT Reduction 19

Emissions Reduction VOC 588

Emissions Reduction NOx 492

Comments/Recommendations

Perform alternatives & feasibility analysis
CMS v/c: avg 0.86, max 1.10

Source of Origin

RPA = CCC Staff
MHD = Mass Highway Dept
MS = Management Systems
PUB = Public Input

KEY:

SBP = State Bike Plan
SPP = State Pedestrian Plan
JTC = Cape Cod Joint Transportation Committee
28 = Route 28 Corridor Study
CMS = Congestion Management System
BYTS = Barnstable/Yarmouth Transportation Study
SRot = Sagamore Rotary Study
ITS = Intelligent Transportation Systems Study
MCS = Monomoy Capacity Study
OCS = Outer Cape Capacity Study
6A = Route 6A Corridor Management Plan
Safe = Cape Cod Accident Record Information System
TDF = Travel Demand Forecast
LCP = Local Comprehensive Plan

Conformity Information

Status

Type

- Other

AO Analysis Yr

RTP# 1006

Rt 28 MacArthur Boulevard Improvements*

Description Bourne - *Recommend MIS - - Construction of 2 new northbound lanes on Rt 28, reverse existing northbound, existing southbound becomes frontage road

Annual Cost

RTP Projected Cost

Upfront Cost \$10,000,000

\$10,000,000

Score

593

Project I.D.

Goal Compatibility Analysis

goal 1 Compatible
goal 2 Compatible
goal 3 Compatible
goal 4 Compatible
goal 5 Compatible

Compatibility
Compatible

Benefits Analysis

Travel Miles 66.1
Travel Hours 11.5
Safety 250.0
Air Quality 80.3
Systems Mgmt 50.0
Infrastructure 10.0
Environment
Mode Shift
Access Mgmt 125.0

Benefit Level 592.9

VMT Reduction 1,719

VHT Reduction 12

Emissions Reduction VOC 749

Emissions Reduction NOx 2,478

Comments/Recommendations

Perform MIS. Detailed study of U-turns & access points would be needed.
• Compatibility with goals must be reexamined; air quality to be reanalyzed as final concepts are developed.
• CMS v/c avg: 0.52-0.97

Source of Origin

28

KEY: SBP = State Bike Plan

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Safe = Cape Cod Accident Record Information System

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LCP = Local Comprehensive Plan

RPA = CCC Staff

MHD = Mass Highway Dept

MS = Management Systems

PUB = Public Input

Conformity Information

Status

Recommended for Study

Type

A - Capital Improvements

AO Analysis Yr

Y-2020

Projects Analysis

SECTION 1 - DESCRIPTIVE

SECTION 2 - QUANTITATIVE

2

RTP# 1025

Expand/enhance Exit 6 Park & Ride

Description Barnstable - Expansion of park&ride capacity at Interchange 6 Park & Ride. Add amenities such as bicycle lockers, indoor ticketing/waiting.

Annual Cost

RTP Projected Cost

Upfront Cost \$1,000,000

\$1,000,000

Score

1,350

Project I.D.

Goal Compatibility Analysis

goal 1 Compatible
goal 2 Compatible
goal 3 Compatible
goal 4 Compatible
goal 5 Compatible

Compatibility

Compatible

Benefits Analysis

VT Reduction

VHT Reduction

Emissions Reduction VOC

Emissions Reduction NOx

Travel Miles

Travel Hours

Safety 10.0

Air Quality

Systems Mgmt 50.0

Infrastructure 25.0

Environment

Mode Shift 50.0

Access Mgmt

Comments/Recommendations

Usage is expected to increase beyond capacity of current improvement plans.

• CMS avg 95%, max 116%

Benefit Level 135.0

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SPP = State Pedestrian Plan

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Source of Origin

CMS

RPA = CCC Staff

MHD = Mass Highway Dept

MS = Management Systems

PUB = Public Input

Conformity Information

Status

Recommended for Study

Type

A - Capital Improvements

AO Analysis Yr

N

Acknowledgements

Cape Cod Joint Transportation Committee

<u>TOWN</u>	<u>MEMBER</u>
Barnstable	Robert A. Burgmann
Bourne	Robert W. Parady, Chair
Brewster	Allan C. Tkaczyk
Chatham	Margaret Swanson
Dennis	Joseph A. Rodricks
Eastham	David Sheptyck
Falmouth	Brian A. Currie
Harwich	Michael J. Pessolano
Mashpee	R. Gregory Taylor
Orleans	Robert Bersin
Provincetown	Joseph J. Borgesi
Sandwich	Peter Tancredi
Truro	Paul A. Morris
Wellfleet	acting DPW Director
Yarmouth	George R. Allaire

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Cape Cod Regional Transit Authority

Massachusetts Executive Office of Transportation & Construction

Massachusetts Highway Department

Bureau of Transportation Planning & Development

Executive Summary

The Regional Transportation Plan is the Long Range Transportation Plan for Cape Cod. Updated every three years under the Intermodal Surface Transportation Efficiency Act, this is the Cape Cod Metropolitan Planning Organization's blueprint for transportation in Barnstable County into the next millennium. Transportation on Cape Cod is examined from three different perspectives, then addressed with policies and strategies for five goals.

For travel to or from Cape Cod, an estimated 200,000 people enter or leave the county on an average summer day. The majority make use of automobiles, evidenced by over 60,000 vehicles per day crossing over the Cape Cod Canal bridges in January, and over 120,000 per day in July. A smaller but growing number of people make use of buses, ferries, airplanes, and trains between the Cape and other destinations.

Travel demand forecasting was used to examine traffic impacts along segments of the Cape's major road corridors. These corridors were also used as to discuss other modes of travel and land use issues. As to be expected, greater vehicular flow occurs on segments of the higher functionally classified roads (e.g., Route 6 - MidCape Highway), and higher congestion occurs along segments with intensive levels of development (e.g., Route 28 from Hyannis to Harwich). Several segments of Route 28 have

effective summer transit service; there is promise for expansion to other communities and year-round operations.

By looking at Cape Cod in smaller units - Sub-Regions - local issues and shorter distance travel needs were explored. Especially apparent was the lack of and need for comprehensive pedestrian and bicycling facilities.

Five goals were distilled from a long list of "Goals to Consider" in the plan issued in 1994. Each goal is now associated with a set of policies and strategies. The first goal, *The "Right" Transportation System*, is achieved by implementing solutions which are consistent with the character of Cape Cod. Such solutions are typically non-invasive; by better managing "people-flow" and efficient use of automobile-capacity, the traditional attempt to build our way out of congestion can be avoided.

For *Modes and Roads*, a comprehensive package of substitutes to automobiles is proposed. New public transit service, bicycle and pedestrian facilities, and other important alternatives are promoted.

The third goal, *Land Use Causes Transportation Causes Land Use*, recognizes the cycle of land use change reacting to transportation improvements which react to land use. Transportation improvements, whether they be the

construction of new capacity or the more efficient use of existing capacity will have implications for land use.

Recommendations are geared toward protecting transportation investments by managing the potential impacts of new development.

In *Traveling Smarter*, new information technologies are explored to help people make the best transportation choices. Strategies include a traffic management center that will fine-tune traffic signal timing and provide traveler advisories via variable message signs and radio, as well as a public transit information system that updates riders on expected wait times and schedule information.

The Regional Transportation Plan will only be effective if we can meet the fifth goal, *Working Together*. The Plan calls for a broader dissemination of information to the traveling public and more opportunities for input via the world wide web, electronic mail and a 24 hour a day message center. New partnerships will be formed that bring together the various levels of government with private parties to make sure that "solutions" do not become new problems.

A summary of proposed strategies which support these goals is presented in Table ES.1 and shown on Figure ES.1. A Regional Transportation Plan Project number is plotted in the general area of the project, projects which do not have locations specified (such as roadway resurfacing) are included in the table but not the figure. In addition, in three cases,

current studies under way should continue, with a final recommendation on the projects in question to be postponed pending completion of these studies. These three study locations are the Sagamore Rotary (RTP #1009), the Bourne Rotary (RTP #1010) and Exit 6 1/2 (RTP #1003).

The plan describes how all this will be paid for. The Federal funding process known as the Transportation Improvement Program can only cover a portion. Towns will need to coordinate with their Local Comprehensive Plans, the Cape Cod Commission will need to adopt an impact fee system, and "Districts of Critical Planning Concern" - or similar mechanisms - will need to be designated to protect transportation capacity. Regional revenue sources need to be identified.

The Next Steps will be big ones. Decisions are about to be made for Cape Cod, a national treasure, that will make a difference. Rather than a transportation future of sprawl and congestion, implementation of the Plan will yield a Cape Cod worthy of travel.

Table ES-1 Summary of Recommended Projects

<u>Title/Description</u>	<u>Description</u>	<u>RTP Project# & Projected Cost</u>
Resurfacing BUNDLED	BUNDLED PROJECTS Roadway Resurfacing & Rehabilitation	900 \$349,600,000
Bridge BUNDLED	BUNDLED PROJECTS Bridge Replacement/Reconstruction	901 \$17,250,000
Transit BUNDLED	BUNDLED PROJECTS Transit Operating Assistance & Bus Replacement	902 \$122,693,109
Intersection BUNDLED	BUNDLED PROJECTS Intersection Improvements	903 \$17,825,000
Bicycle/Pedestrian Projects BUNDLED	BUNDLED PROJECTS - bicycle and/or pedestrian facilities and programs	904 \$5,750,000
Access Management BUNDLED	Eligible for all state and local numbered routes. Curb cut consolidation, medians, other access improvements	905 \$11,500,000
Transportation Enhancements BUNDLED	BUNDLED PROJECTS - Enhancements to the transportation system - per ISTEA	906 \$11,500,000
TDM/TSM BUNDLED	BUNDLED PROJECTS - Travel Demand Management/Transportation Systems Management projects	907 \$11,500,000
New Ferry Service - BUNDLED	BUNDLED PROJECTS - Passenger ferries connecting Cape Cod harbors	908 \$5,750,000
Regional Bike Network BUNDLED	BUNDLED PROJECTS - Regional links of bicycle trails and inter-town paths	909 \$9,150,000
Cape Cod Rail Trail Bridges	Cape Cod Rail trail bridges over Route 6 in Harwich and Orleans	1000 \$1,000,000
Hyannis Intermodal Center - ph. 1	Construction of facility for inter-city bus and rail operations with shuttles to airport & ferries, pedestrian links to downtown Hyannis.	1001 \$4,062,500
Hyannis Intermodal Center - ph. 2+	Completion of facility for inter-city bus and rail operations with shuttles to airport & ferries, pedestrian links to downtown Hyannis.	1002 \$4,062,500
Rt 28 MacArthur Boulevard Improvements*	Bourne - *Recommend MIS - - Construction of 2 new northbound lanes on Rt 28, reverse existing northbound, existing southbound becomes frontage road	1006 \$10,000,000

Table ES-1 Summary of Recommended Projects

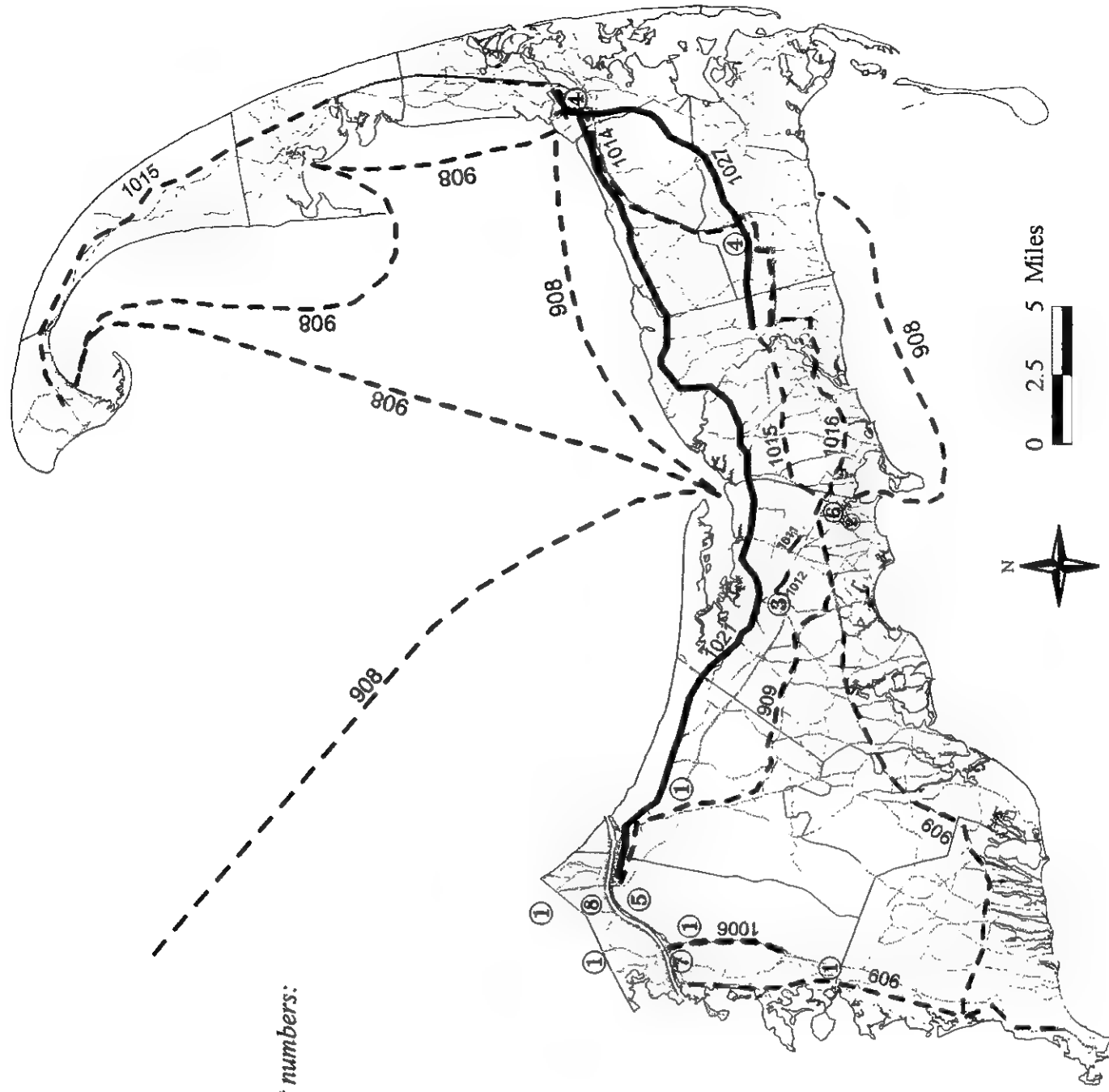
<u>Title/Description</u>	<u>Description</u>	<u>RTP Project# & Projected Cost</u>
Rt 6 Reconfigure Interchange One	Improve westbound on-ramp near Sagamore Bridge during peak times for off-cape traffic flow	1008 \$1,150,000
Attucks Way Extension	Barnstable - Construction of new roadway connecting Attucks Way to Old Rt 132	1011 \$2,500,000
Rt 132 Boulevard	Barnstable - Construction of 2 new lanes from Rt 6 to Bearses Way	1012 \$7,500,000
Cape Cod Rail Trail Resurface & Widen	Eastham to Dennis - Resurface and widen original rail trail to 12'	1014 \$1,000,000
Cape Cod Rail Trail Extensions	Extend Cape Cod Rail Trail to Provincetown in the north, Hyannis in the west	1015 \$4,000,000
Rt 28 Bike Accommodation - Hyannis-Dennis	Construction, marking, and signage of Bicycle facility along Route 28	1016 \$5,000,000
Rt 6A Shuttle Service	Public transit shuttle connecting villages along Route 6A from Sandwich to Orleans	1021 \$2,300,000
Transportation Management Center	Operations center to monitor traffic operations, issue real-time reports to traveling public, control variable message signs and coordinated traffic signals	1022 \$6,450,000
Variable Message Signs	Remote operated variable message signs installed along all major routes - Rt 6, Rt 28 in Bourne & Falmouth, Rt 25 Extension, Rt 3	1023 \$430,000
Permanent Traffic Counting Stations	Install permanent traffic counting stations at strategic locations Cape-wide	1024 \$103,000
Expand/enhance Exit 6 Park & Ride	Barnstable - Expansion of park&ride capacity at Interchange 6 Park & Ride. Add amenities such as bicycle lockers, indoor ticketing/waiting.	1025 \$1,000,000
Safety Improvements Rt 6	Dennis to Orleans - Implement improvements to Route 6 from Dennis to Orleans that preserve the character of the region while having a clear safety benefit	1027 \$12,000,000
Telecommuting Center	Demonstration Project - Cape Cod center w/telecommuting equipment (computers/modems/fax, etc.) to reduce trips to off-cape employment centers.	1029 \$250,000
Land Conservation	Strategic purchase of land to reduce sprawl and inefficient allocation of transportation resources	1030 \$11,500,000



Table ES-1 Summary of Recommended Projects

<u>Title/Description</u>	<u>Description</u>	<u>RTP Project# & Projected Cost</u>
Cape-wide Highway Advisory Radio	Provide travel information cape-wide via AM radio	1031 \$100,000
Cape Cod Capacity Study	Cape-wide study using methods developed for the Outer Cape & Monomoy Area Capacity Studies	1035 \$50,000
Harwich/Chatham Rail Trail Extension	Extend Cape Cod Rail Trail from Harwich to Chatham	1036 \$985,000
Rt 6 Eastham - Safety Improvements	Eliminate conflict points along Route 6	1037 \$1,200,000

Figure ES.1 Regional Transportation Plan Projects



Corridor Projects are labelled with project numbers:

- 908: Marine Transportation Study
- 909: Regional Bicycle Network
- 1006: MacArthur Boulevard MIS
- 1011: Attrucks Way Extension
- 1012: Route 132 Boulevard
- 1014: Cape Cod Rail Trail Improvements
- 1015: Cape Cod Rail Trail Extensions
- 1016: Route 28 Bicycle Accommodation
- 1021: Old Kings Highway Shuttle
- 1027: Route 6 Safety Improvements

Site-Specific Projects are marked with numbered circles as follows:

- ① 1023: Variable Message Signs
- ② 1022: Transportation Management Center
- ③ 1025: Expand Exit 6 Park and Ride
- ④ 1000: Cape Cod Rail Trail Bridges
- ⑤ 1008: Reconfigure Exit 1
- ⑥ 1001/1002: Hyannis Intermodal Center
- ⑦ 1010: Bourne Rotary Study
- ⑧ 1009: Sagamore Rotary Study

Many corridors and locations shown on this map are approximate and chosen for illustrative purposes only. This map does not include projects that are not location-specific. Projects listed in the Long Range Transportation Plan must also be listed in a Transportation Improvement Program in order to receive state or federal funding. Projects may also require review by the Cape Cod Commission under the Regional Policy Plan.

Figure ES-2 - Projected Transportation Expenditures

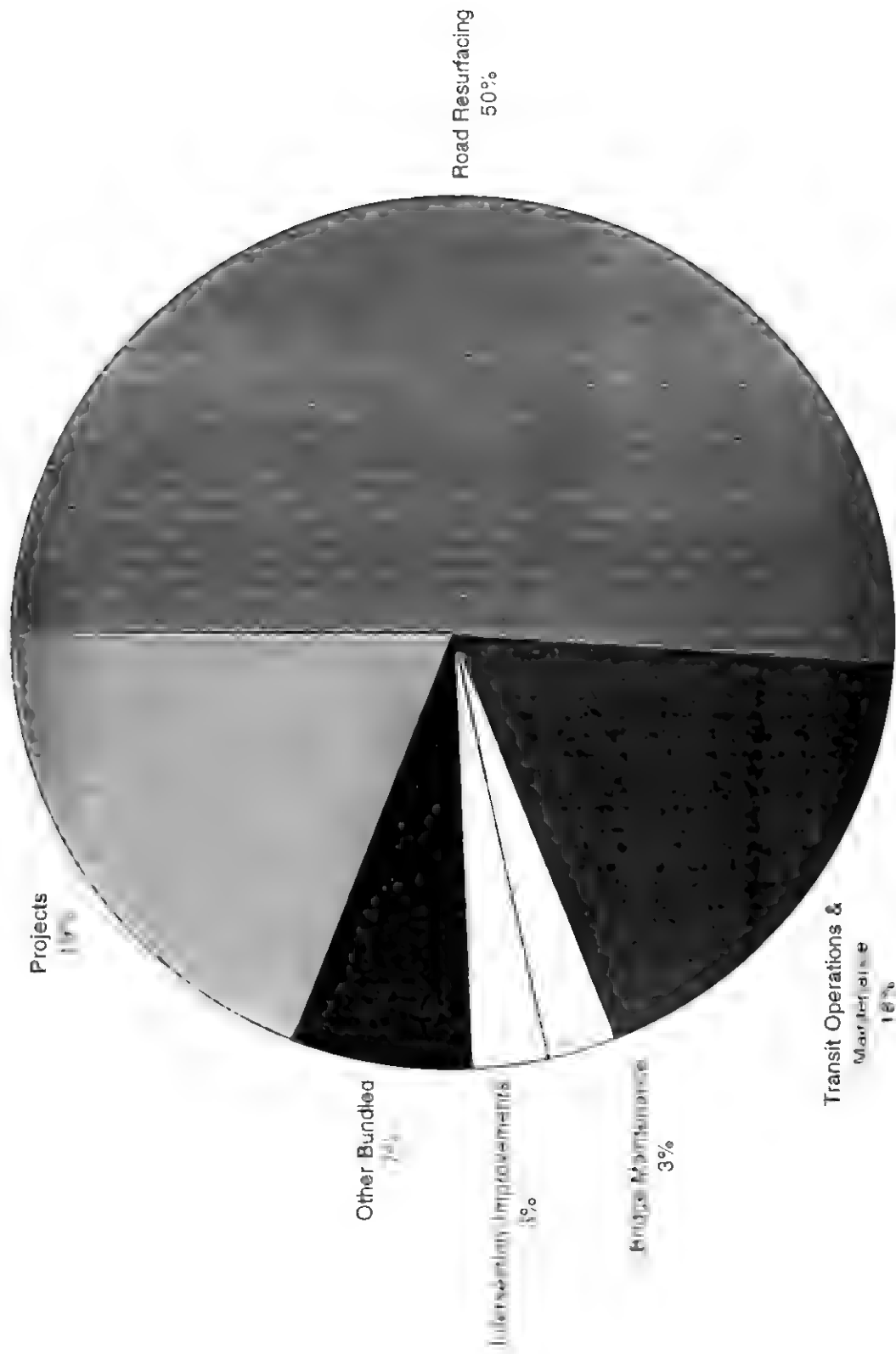


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1. - Introduction: Getting from A to B

The transportation future of Cape Cod is rooted in its past. Accessibility has been a defining force in how villages developed and where roads were built. The predominant means of experiencing Cape Cod is, to no one's surprise, the automobile. Much of what is sought, including the "rural" qualities of the Cape's two lane roads, is threatened by "traditional" solutions of expanding capacity for automobiles with little or no accommodation for alternatives.

Cape Cod is a tourist destination, the market includes New England and beyond. Cape Cod is for living - workers, retirees and seasonal residents base their daily trip-making from Cape communities. Cape Cod has jobs - thousands of people commute to and within Barnstable County each work day.

The Regional Transportation Plan is the laboratory where many of our questions are answered about getting from A to B. A better understanding of our land use and development patterns has enabled us to better identify where all the trip origins (the "A's") and destinations (the "B's"). Knowing how - by what routes, by what means - helps us identify existing transportation problems and potential solutions. Anticipating potential problems before they occur and doing something about them is the real planning. Recognizing that some of these solutions will be to add transportation capacity, others will be demand-oriented, with a goal to better organize land use. Another important element of our plan is recognition that much of our effort will be focused on keeping what we've got - that is, by maintaining and operating our existing system.

1.1. - ISTEA - The Intermodal Surface Transportation Efficiency Act of 1991

In developing metropolitan transportation plans and programs, the Bureau of Transportation Planning has directed that each MPO shall, at a minimum, consider and be responsive to the "16 ISTEA Factors," as listed below:

1. Preservation of existing transportation facilities and, where practical, ways to meet transportation needs by using existing transportation facilities more efficiently.
2. Consistency of transportation planning with applicable Federal, State, and local energy conservation programs, goals and objectives.
3. The need to relieve congestion and prevent congestion from occurring where it does not occur.
4. The likely effect of transportation policy decisions on land use and development and the consistency of the transportation plans and programs with the provisions of all applicable short and long-term land use and development plans.
5. The programming of expenditures on transportation enhancement activities as required in section 133.
6. The effects of all transportation projects to be undertaken within the metropolitan area, without regard to the source of funding.
7. International border crossings and access to ports, airports, intermodal transportation facilities, major freight distribution routes, national parks, recreation areas, monuments and historic sites, and military installations.
8. Connectivity of roads within metropolitan areas with roads outside of these areas.
9. Transportation needs identified through the use of the management systems

required by section 303 of this title.

10. Preservation of rights-of-way for construction of future transportation projects.
11. Methods to enhance the efficient movement of freight.
12. The use of life-cycle costs in the design and engineering of bridges, tunnels, or pavement.
13. The overall social, economic, energy, and environmental effects of transportation decisions.
14. Methods to expand and enhance transit services and to increase the use of such services.
15. Capital investments that would result in increased security in transit systems.
16. Recreational travel and tourism.

1.2. - The Integrated Planning Process

This section includes a summary of the 1995 residents' survey and describes the relationship of the various elements of the process and also includes information on the implementation element of planning - the Transportation Improvement Program.

1.2.1. - Public Input

Respondents to the 1995 Cape Cod Residents Survey prefer to deal with congestion problems by limiting population growth, acquiring developable land and using more stringent land use regulation, including restrictions on construction of new buildings and residential dwellings. No less than 85% of respondents wanted to encourage the provision of alternative modes of transportation. The majority of

respondents to the survey were opposed to widening of roads and intersections. In essence, most residents prefer to lessen traffic congestion by reducing the amount of new traffic rather than increasing the Cape's ability to accommodate it.

The Regional Transportation Plan has been discussed monthly public meetings of the Cape Cod Joint Transportation Committee. Three evening workshops were held in October 1996 in the towns of Sandwich, Eastham, and Dennis. For a summary of comments, the workshop overview, input from agencies, please see the appendix.

1.2.2. - Transportation Planning

Figure 1.0 shows the relationship between the Regional Transportation Plan, the Transportation Improvement Program (TIP), and the other elements of the process. Many of these elements are discussed in other sections of the Plan. The TIP is described in the following section.

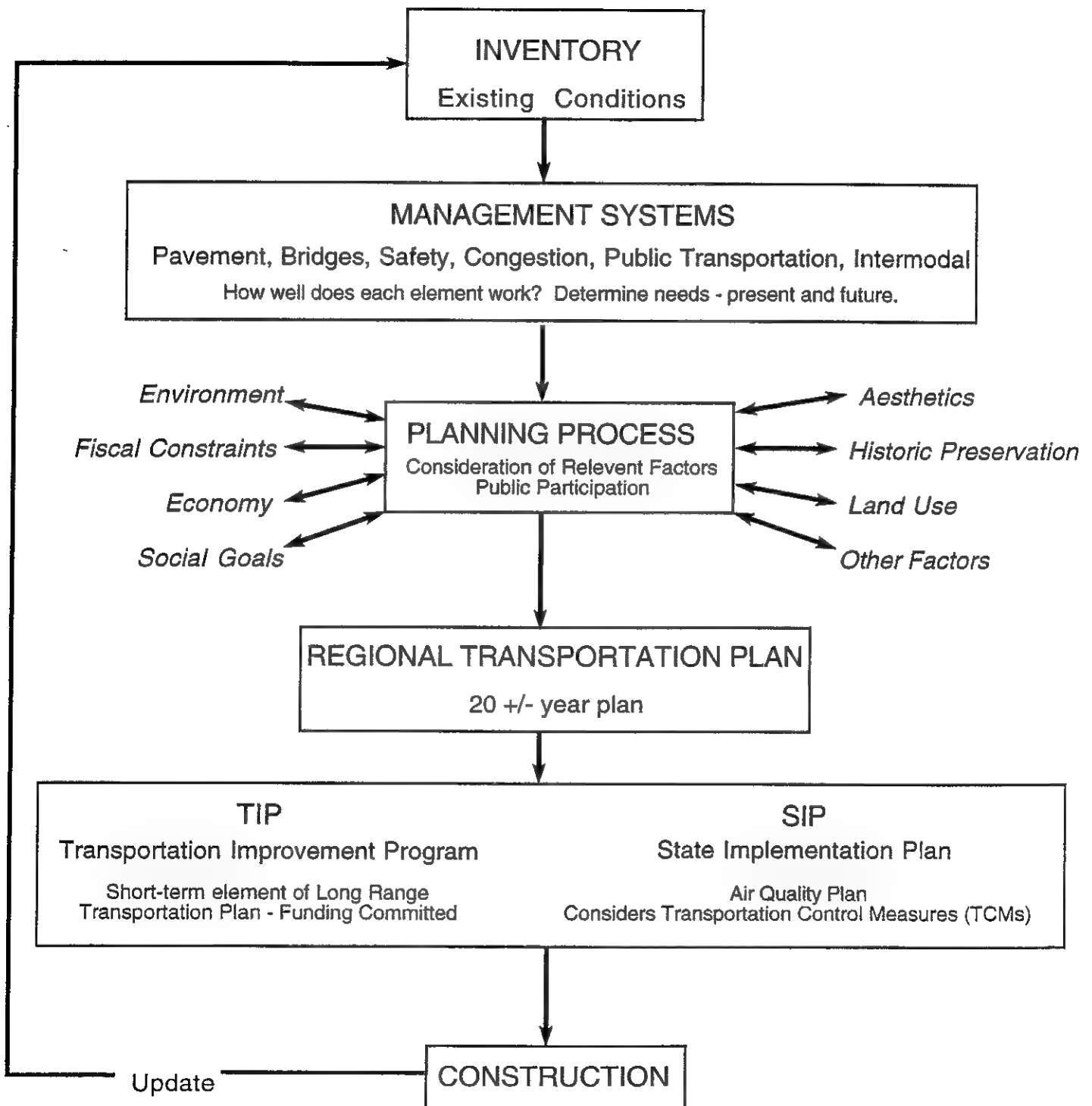
1.2.3. - Transportation Improvement Program

The Transportation Improvement Program, or "TIP," is a planning program of capital improvement projects to the federal aid eligible components of the transportation system on Cape Cod. The TIP is created from the Regional Transportation Plan to schedule funding for transportation projects.

The TIP's list of projects is put together locally by the Cape Cod Commission transportation staff working with the Cape Cod Joint Transportation Committee and CCRTA in cooperation with state and federal agencies. The committee, known as the CCJTC, is made up of representatives of the fifteen Barnstable County towns. Ex-officio members include the Executive Office of Transportation and Construction,

Fig. 1.0

OVERVIEW OF TRANSPORTATION PLANNING PROCESS



the Massachusetts Highway Department, the Association for the Preservation of Cape Cod, and the Cape Cod Regional Transit Authority. Procedurally, the CCJTC receives a TIP development schedule, usually in January and a "target" figure is supplied by the state based on a formula allocation. Staff typically transmits a draft to the state for review in March and a final draft is distributed, usually in June.

The TIP has three years of projects and is updated yearly. The TIP is organized by funding category within each federal fiscal year (e.g., federal fiscal year 1997 is from October 1, 1996 to September 30, 1997). The TIP must be financially constrained and in conformity with the state plan to improve air quality.

This cyclical, multi-month process usually results in endorsement of the TIP in August at a meeting of the Cape Cod Metropolitan Planning Organization. The Cape's TIP is combined with all other TIPs in Massachusetts to form the State Transportation Improvement Program (STIP) and submitted to federal agencies for review and a 30 day comment period. With completed MHD approved designs and federal approval, projects in the annual element may proceed beginning on October 1.

1.3. - Cape Cod's Transportation Planning Goals

- To establish and maintain a transportation system on Cape Cod for present and future year-round and seasonal needs which is safe, convenient, accessible, economical and consistent with the Cape's historic, scenic and natural resources.
- To reduce dependence on private automobiles by developing and

integrating alternate modes (e.g., rail, bus, ferry, air, bicycle and pedestrian) into the transportation system and by promoting substitutes for transportation such as telecommunications.

- To support transportation solutions which preserve and enhance Cape Cod's character by considering the interrelationship between changes in transportation capacity and changes in land use.
- To promote an information-based consumer-oriented transportation system that encourages travelers to use the most environmentally sensitive and efficient means of travel.
- To promote cooperation among the various transportation agencies which have responsibility for the Cape's transportation system.

1.4. - Coordination with Transportation Planning Efforts

Regional transportation planning requires coordination with smaller-scale or specialized plans. The following sections describe the activities of these efforts. The last subsection, Management Systems, describes activities which specifically support the Regional Transportation Plan. The Congestion Management System is especially relevant since it forms a source of identifying problems and generating and monitoring solutions.

1.4.1. - The Regional Policy Plan

Under the Cape Cod Commission Act, a Regional Policy Plan (RPP) is prepared every five years to guide development in Barnstable County. The RPP covers many issue areas in addition to transportation such as Natural Resources, Economic Development, Affordable Housing, Heritage Preservation, and many others. Land use and growth policies are central to the issue areas.

The RPP promotes a balanced approach to transportation that follows a sensible land use and growth management policy and includes the following elements:

- Provide a source of funding for desirable transportation improvements,
- Require new development to mitigate impacts in a manner consistent with Cape Cod's natural, scenic and historic resources,
- Promote safe access to roadways and property through controlled driveway and intersection spacing,
- Promote land, air, and marine based alternatives to automobile travel.

1.4.2. - The Barnstable/Yarmouth Transportation Study

The Barnstable/Yarmouth Regional Transportation Study, known as BYTS, has been ongoing since 1991. Cape Cod Commission staff have been participants in the technical committee which includes representatives of the towns of Barnstable and Yarmouth, the Cape Cod Regional Transit Authority, the Massachusetts Highway Department, the Steamship Authority, Hyline Ferry, Cape Cod Hospital, Barnstable Municipal Airport, and the Hyannis Chamber of Commerce.

Key objectives of BYTS are to:

- improve access between regional highway and airport, other terminals and business areas
- increase coordination among the different modes
- expand transit service and alternative modes to reduce reliance on private vehicle
- enhance operations of major arterials and highways through use of new technology and inter-jurisdictional coordination
- integrate the private sector in the planning and operational aspects of the transportation system.

The next sections introduce two BYTS efforts sponsored by the Commission. A summary of other BYTS efforts is included in the appendix.

1.4.2.1. - Travel Demand Management

This study element, completed in 1995, included the following highlights:

The Short Range TDM/TSM Study was completed for the Cape Cod Commission through a grant from the Massachusetts Highway Department as part of their effort to assist Barnstable and Yarmouth in improving overall travel conditions on the area's transportation system, particularly during the summer period when demands reach their peak. The effort is strongly related to the Barnstable-Yarmouth Regional Transportation Study (BYTS), representing an element of the short range plan. Findings from the BYTS work, the CMAQ Signal Demonstration Grant Project, the Short Range Parking Plan and the Yarmouth Engineering Study were reviewed and incorporated as appropriate. Importantly findings from this TDM/TSM effort may also be relevant to other parts of the Cape as well.

The Barnstable-Yarmouth Regional Transportation Study and the Yarmouth Engineering Study included an assessment of the major roadways and the intersections in the study area. The highlights of these analyses which became one basis for evaluation during this TDM/TSM study are summarized as follows:

- of more than 90 intersections studied, 41 (18 signalized and 23 unsignalized) were identified with congestion or safety related problems,
- the two key existing interchanges with Route 6 (Exits 6 and 7) that serve the area currently experience significant problems that include conflicts with nearby intersecting streets and long delays to ramp exiting traffic resulting in queues that at times reach Route 6,
- current signal progression is lacking through the area on major arterials and in the downtown area,

- existing two lane sections of Route 132, Route 28 and Willow Street carry volumes well in excess of desirable two lane service volume levels,
- excessive curb openings or poorly defined openings exist on many roadways but particularly on Route 28 from approximately Bearses Way in Barnstable to the east through the Town of Yarmouth,
- the inadequate roadway capacity coupled with poorly operating, outdated signals, uncontrolled movements on and off the key corridors result in relatively long travel times and less than desirable access from Route 6 to the major terminals, the downtown and along the Route 28 corridor throughout the region,
- a high parking demand exists within the downtown Hyannis core and summer recreational areas that exceeds the available public or the major transportation terminal related supply, (although SSA has recently taken steps to meet its short range needs with the purchase of a site near the existing railroad station)
- excessive traffic circulation takes place as a result of less than desirable signing as well as the inadequate parking at the terminals, in downtown and at certain beaches,
- adequate facilities simply do not exist to safely accommodate and encourage bicycle travel and pedestrian movement for the various types of trips including along the major arterials,
- the provision of travel information to the public to make decisions before and during the trip is inadequate,
- surveys of current travel patterns indicate a very high proportion of single occupant vehicles used by on-Cape commuters in the two towns,

- the predominant mode among arriving visitors to the region is also the private vehicle.
- a limited amount of fixed route transit service exists in the study area, particularly during the non-summer period, and
- Phase 1 of the BYTS effort also identified the low level of coordination among mass transportation routes and/or schedules which will tend to work contrary to the goal of attracting riders and reducing single occupant vehicles.

1.4.2.2. - Short Range Parking Study

The purpose of this study, also completed in 1995, was to identify and evaluate optional strategies to better satisfy current parking requirements or immediate growth in relation to key transportation terminals, beaches, and downtown Hyannis. It is intended to be one tool to manage congestion and improve vehicle and pedestrian safety and accessibility in Cape Cod's urban core. The plan focuses on the peak summer period. This short range parking study is related to the Travel Demand Management/Transportation Systems Management effort as parking strongly influences TDM/TSM effectiveness.

The study area essentially includes the town of Yarmouth and the Hyannis section of Barnstable. The primary study area within Barnstable covers an area bounded to the west by Centerville, north by Route 6A and east by the Barnstable/Yarmouth Town Line. The core study area within Yarmouth covers an area bounded to the north by Route 6A, east by North Main Street, and west by Yarmouth/Barnstable Town Line.

Available information and data were compiled regarding:

- existing public parking supply in study area
- current/projected peak parking demands
- current growth issues
- current intermodal plans

Critical parking needs of the study facilities were identified. In addition, short v. long term parking characteristics of the study facilities, walking distances between these parking facilities and activity centers, and fee policies were investigated.

Various parking strategies were identified and evaluated against a set of criteria for selecting new parking sites. Parking management strategies as well as potential new parking supply sites were evaluated. Costs of various types of measures were estimated and the final short range parking plans were recommended.

For more specific information please see the appendix.

1.4.3. - The Outer Cape Capacity Study

The Outer Cape Capacity Study looked at the four towns on the lower Cape to estimate the capacity of the region to handle future growth. In addition to the region's transportation infrastructure, the study looked at land use, water resources, natural resources and fiscal impacts of growth. The primary focus of the study was on future summer and winter scenarios in 2020 and under "build out" conditions, or the maximum development permitted under current zoning in each of the towns.

The transportation impacts of predicted growth were significant. Future winter traffic conditions are predicted to equal current summer traffic conditions, while future summer traffic is predicted to surpass anything seen in the region today. The region currently has some congestion in certain areas such as Route 6 in Wellfleet. In the future, it is predicted that congestion will spread and worsen. By 2020 all of Route 6 from the Orleans rotary to the Provincetown border will be considered "over capacity" during a summer Saturday afternoon. In addition, by 2020 the total number of vehicle miles traveled in the outer Cape every summer Saturday afternoon will increase by 250%.

The study listed some policy options for the region to explore as a way to avoid these predicted levels of traffic, although it did not list a preferred option. Options listed included reducing the growth rate of the region with lower levels of development concentrated in village centers, use of transportation systems management strategies such as access management, and use of transit and bikeways to reduce demand for automobile traffic.

1.4.4. - The Monomoy Capacity Study

The Monomoy Capacity Study looked at the five town region on the "elbow" of Cape Cod to estimate the capacity of the region to handle future growth. In addition to the region's transportation infrastructure, the study looked at land use, water resources, natural resources and fiscal impacts of growth. The primary focus of the study was on selected future scenarios, including summer and winter scenarios for future years. The study also looked at "build out" conditions, or the maximum development permitted under current zoning in each of the towns. Finally, it looked at a winter scenario for 2015 in which the region has an increased percentage of year-round housing.

The transportation impacts of predicted growth were significant. Future winter traffic conditions are predicted to match current summer traffic conditions, while future summer traffic is predicted to surpass anything seen in the region today. The region currently has some congestion in certain areas. In the future, it is predicted that congestion will spread and worsen. By 2005, the study predicted, almost one-third of all the major regional roadways will be congested during the summer rush hour. Most notably, the study found that future winter traffic will approach or exceed current summer traffic by 2015, even if no change in the percentage of year-round housing occurs.

The study listed some policy options for the region to explore as a way to avoid these predicted levels of traffic, although it did not list a preferred option. Options listed included reducing the growth rate of the region through public acquisition of developable land, use of transportation systems management strategies such as access management, and the possible widening of some regional roadways. However, the study did note that many of the predicted future problems of the region will require regional solutions that encompass not only the Monomoy region but the whole of Cape Cod.

1.4.5. - Route 6A Corridor Management Plan

One of the special programs created under ISTEA includes the National Scenic Byways Program. This program emphasizes conservation of a scenic byway's intrinsic qualities while addressing transportation and tourism needs common to such designated roadways. Route 6A was one of two roadways in the Commonwealth of Massachusetts to be eligible for funding under the state's Interim Scenic Byways Program, due in part to its designation as a scenic road by the State legislature in June, 1992.

The purpose of this study under the Interim Scenic Byways program is to develop a Corridor Management Plan for Route 6A that will guide the protection of the corridor's unique resources while addressing necessary transportation and safety issues. Without such a plan, the road is likely to face increasing transportation and growth pressures and will cause incremental loss of the character-defining features that currently support its designation as a scenic road. The overall goals of the Corridor Management Plan are to:

- preserve the character and scale of the roadway
- address transportation pressures on the roadway
- protect the historic, scenic and environmental resources along the corridor
- enhance safety for all roadway users - pedestrians, bicyclists, motorists
- promote coordination between agencies with jurisdiction over the corridor
- increase awareness of the roadway's significance

The primary strategies explored to achieve these goals include intrinsic resource protection, land-use and zoning regulations, alternative designs for transportation and roadway improvements, an access management plan for the corridor, increased alternative transportation mode opportunities, and partnerships with existing visitor facilities along the corridor. These and other recommendations are explored in the study and will continue to be developed in future work under the Scenic Byways program.

A secondary purpose of the study is to help Massachusetts Highway Department develop policies regarding management of scenic roads and to assist in the development of the State's Scenic Byways program for other scenic roadways on Cape Cod and throughout the Commonwealth.

1.4.6. - Pedestrian Planning

Two significant efforts are ongoing. The Statewide Pedestrian Plan will develop a policy document for helping all levels of government and private property owners in addressing pedestrian needs. The Cape Cod Pathways Project is a concerted effort to create a network of walking trails Cape-wide.

1.4.6.1. - Statewide Pedestrian Plan

The Massachusetts Pedestrian Transportation Plan will guide state, regional, and local transportation and land use policy, planning, and practice to better meet the walking needs of residents and visitors alike.

The Massachusetts Highway Department is the sponsor of the plan, and one of the many players with the capacity to improve walking conditions. This plan seeks new opportunities for building partnerships with local public and private interests to encourage safe, convenient walking throughout the state. Because most walking is local, the Highway Department encourages strong local initiative in identifying, planning, and setting priorities for pedestrian improvements.

Walking is central to most trips: people walk to transit services, they walk from parking spaces to stores and offices, and some walk as a primary mode of transportation. The plan considers the pedestrian realm in urban, suburban, and rural areas throughout Massachusetts, using prototypes as models for physical improvements in a variety of situations. The plan also recommends local and statewide encouragement and education programs, law enforcement initiatives, and improvements in the coordination of policy and planning for facilities and programs. It focuses on solutions that state, regional, and local agencies and private organizations can apply to situations throughout Massachusetts.

1.4.6.2. - Cape Cod Pathways

Cape Cod Pathways is an effort to create a Capewide network of walking trails linking existing protected open space and visitor attractions. As envisioned, Cape Cod Pathways would extend from Falmouth to Provincetown with connections to all fifteen Cape Cod towns. The trail network would have a variety of benefits ranging from the protection of open space and provision of year-round recreational opportunities, to provision of an alternate mode of transportation for both residents and visitors, to tourism enhancement.

The Cape Cod Pathways initiative was begun in 1994. Since then, the project has garnered widespread support from the Barnstable County Assembly of Delegates, Cape Cod National Seashore, town officials, conservation organizations, businesses and other groups as well as extensive publicity. The Cape Cod Commission has been working with the County Commissioners and an Advisory Council made up of citizens and organizations across Cape Cod to coordinate the effort to date. Funding and technical assistance has been provided by the National Park Service Rivers, Trails and Conservation Assistance Program, Massachusetts Department of Environmental Management, DuPont Greenways Program and the Jessie B. Cox Charitable Trust. Pathways is also eligible for state Open Space Bond funds.

The Cape Cod Commission is currently working with towns and volunteers to identify and map existing trails and potential new trail connections. Wherever feasible, existing trails will be incorporated into the network. Decisions about the location of the trails will be made by landowners and land managers in conjunction with town officials and the Cape Cod Commission. The trail network will be established through a variety of methods including acquisitions, easements, and leases with property owners. Trail guides will be completed for dedicated trail segments.

Completion of the entire network is a long-term effort that will take many years. By the end of 1996 we anticipate that approximately 30 miles of the trail will be in place. Ongoing mapping, trail identification and acquisition projects will continue to boost trail mileage in coming years.

1.4.7. - Statewide Bicycle Plan

The purpose of the statewide plan is to develop policies and practices to improve conditions for bicycling in the Commonwealth. It draws upon *Accessing the Future: The Intermodal Transportation Plan for the Commonwealth of Massachusetts*.

Goals include:

- Plan, promote, and provide safe travel for bicyclists and pedestrians, in a manner appropriate for each group, recognizing that bicycling and walking have distinct operational characteristics and safety requirements.
- Provide bicycle and pedestrian facilities and encourage bicycle and pedestrian travel as viable transportation modes.
- Reduce demands placed on highway facilities by encouraging the use of Transportation Demand Management (TDM), increasing the use of alternative modes, and providing substitutes for travel.

A major focus of the plan is the development and testing of a methodology to assess the suitability of roadways for bicycling. Roadway characteristics, such as traffic volume and speed, width of travel lanes and shoulder, and truck volume, were evaluated at sample locations throughout the state. Recommendations are being developed in the following areas:

- planning, design, construction, and maintenance activities
- education and training programs
- public awareness, incentive, and marketing programs
- enforcement policies and practices
- tourism promotion
- zoning and land use changes

1.4.8. - Marine Planning

There is a great deal of public support for ferry service as a mode of transportation on Cape Cod, particularly on the lower Cape. Two activities are ongoing which focus on ferry service.

1.4.8.1. - Steamship Authority Planning Activities

The Steamship Authority has recently developed a forecasting model to better understand future demand for passenger and automobile ferry travel to the islands of Martha's Vineyard and Nantucket. Key findings include: by 2005, there will be a need for 25-40% more passenger capacity on the Martha's Vineyard routes, and 10-15% more space to Nantucket. There are expected to be shortages of automobile-ferry capacity on both routes as well. By 2005, there is an expected need for 2,000 parking spaces for Woods Hole, 300 for Hyannis. These spaces, are for the most part, expected to require shuttle service.

SSA has also recently completed a fare elasticity study to determine the effects of ticket price on ridership. It concluded that increases in fares would not decrease ridership.

1.4.8.2. - Marine Transport Study

The Cape Cod Economic Development Council and the Cape Cod Commission have recently begun a joint study on the feasibility of increasing ferry service to and

around Cape Cod. This study is expected to be completed in the Fall of 1997. It will examine alternative routes and schedules for proposed new services and estimate ridership for these routes.

1.4.9. - Management Systems

ISTEA provides for a formalized approach in dealing with various aspects of transportation in the form of "Management Systems." These systems have been designed to provide comprehensive and timely information to support public investment and operational decisions for the Cape's transportation system. There are a number of systems described in ISTEA, the following sections outline management systems being operated by the Commission.

1.4.9.1. - Congestion

Improving the mobility of all Cape residents and visitors is the goal of the Cape Cod Congestion Management System (CMS). To accomplish this goal, the CMS has been designed to provide comprehensive and timely information to support public investment and operational decisions for the Cape's transportation system. The CMS, and the other Management Systems, will play a key, strategic role in an improved planning process on Cape Cod.

Under the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), the Congestion Management System has been defined as "a systematic process that provides information on transportation system performance and alternative strategies to alleviate congestion and enhance the mobility of persons and goods. A CMS includes methods to monitor and evaluate performance, identify alternative actions, assess and implement cost-effective actions, and evaluate the effectiveness of implemented actions."

Mobility enhancement, rather than simply congestion reduction, has been established as the goal of the Massachusetts CMS. To this end, transit services are not merely strategies to reduce congestion, but rather proactive programs to provide transportation choices and improve performance. For this reason, the evaluation of transit operations is within the scope of the CMS. Facilities where transfers between transit modes take place, such as park-and-ride lots are included in the CMS. Finally, while ease of walk and bicycle access will be part of any transit operation assessment, full consideration of these as independent alternative modes will only be phased in later in the development of CMS.

Facilities or vehicles within the CMS are not assumed to be already congested, but rather are being "monitored" to determine if congestion is present. Those not in the CMS will not be monitored. Congestion is defined to include both persons and vehicles, and congestion on transit vehicles is within the purview of the CMS. CMS facilities have been grouped into three broad categories, discussed in the following sections:

1.4.9.1.1. - Roadway Facilities

Travel time data were collected on Roadway facilities shown in Figure 1.1. A summary of estimated volume to capacity (v/c) for corridor segments is presented in the appendix. The v/c was calculated with factors used in the travel demand forecasting model. The v/c is assumed to be a function of the measured speed as compared to the speed limit. The maximum as well as the average v/c is presented. The database includes other data, such segment length and latest traffic count available. As a tool, the database will continue to be improved as a means of identifying and analyzing transportation solutions.

Figure 1.1 - Congestion Management System Roadways



1.4.9.1.2. - Transit Routes

A listing of origin and destinations with associated travel time is presented in the appendix. The data are organized by service (and separated by schedules) and direction. The database also includes the scheduled departure times and some information on total occupancy at key locations

1.4.9.1.3. - Park & Ride Lots

Occupancy of the three Mass Highway lots is presented in the appendix. The heavy usage of Barnstable and Sagamore will be closely monitored. Growth at the Harwich lot has been significant; not included in the data have been informal observations of 20-30 vehicles in January of 1997. 1997 peak season usage is expected to exceed 2/3.

1.4.9.2. - Pavement

The Commission is in the process of implementing a pavement management system for Barnstable County that will provide an objective tool used to:

- plan the budget for roadway maintenance, repair, and reconstruction,
- select projects knowing where pavements are that need repair, when repairs are required, and what repair strategy is appropriate, and
- evaluate the benefits of alternative projects.

The Federal Highway Administration defines pavement management systems as "A set of tools or methods that assist decision makers in funding cost-effective strategies for providing, evaluating and maintaining pavement in a serviceable condition."

The overall goal of the Barnstable County Pavement Management System is to obtain the greatest return on monetary investments of roadway pavement.

Recently, the region has completed the first phase of data collection for 555 miles of STP roads and 11 miles of NHS roads. The first phase consisted of hiring a consultant to inventory roadways and conduct a pavement conditions survey of approximately 360 miles of roadway. The results of the asphalt condition survey ratings for those roadways inventoried are included in the appendix.

1.4.9.3. - Intermodal

The Cape Cod Commission has been part of a statewide technical committee working to identify needs, actions/strategies to address those needs (including the evaluation of strategies/actions already implemented), and provide information so that sound transportation decisions can be made regarding:

- The concerns of the public, transportation providers, MPOs, and other public officials, which are solicited via a proactive public involvement and planning process.
- The efficient, cost effective, and enhanced movement of freight and interregional passenger flows.
- The consistency of actions and strategies regarding direct and indirect costs of reasonable alternatives and factors such as mobility improvements; environmental, economic and social effects and goals including impacts on housing, employment, land use, and community development; safety, including security in transit systems; traffic congestion; economic development including the needs of the disadvantaged; financing; energy consumption; impacts to other transportation modes; and the preservation of right-of-way for construction of future transportation projects. A draft inventory of intermodal facilities is available in the Appendix.

2. - The Cape

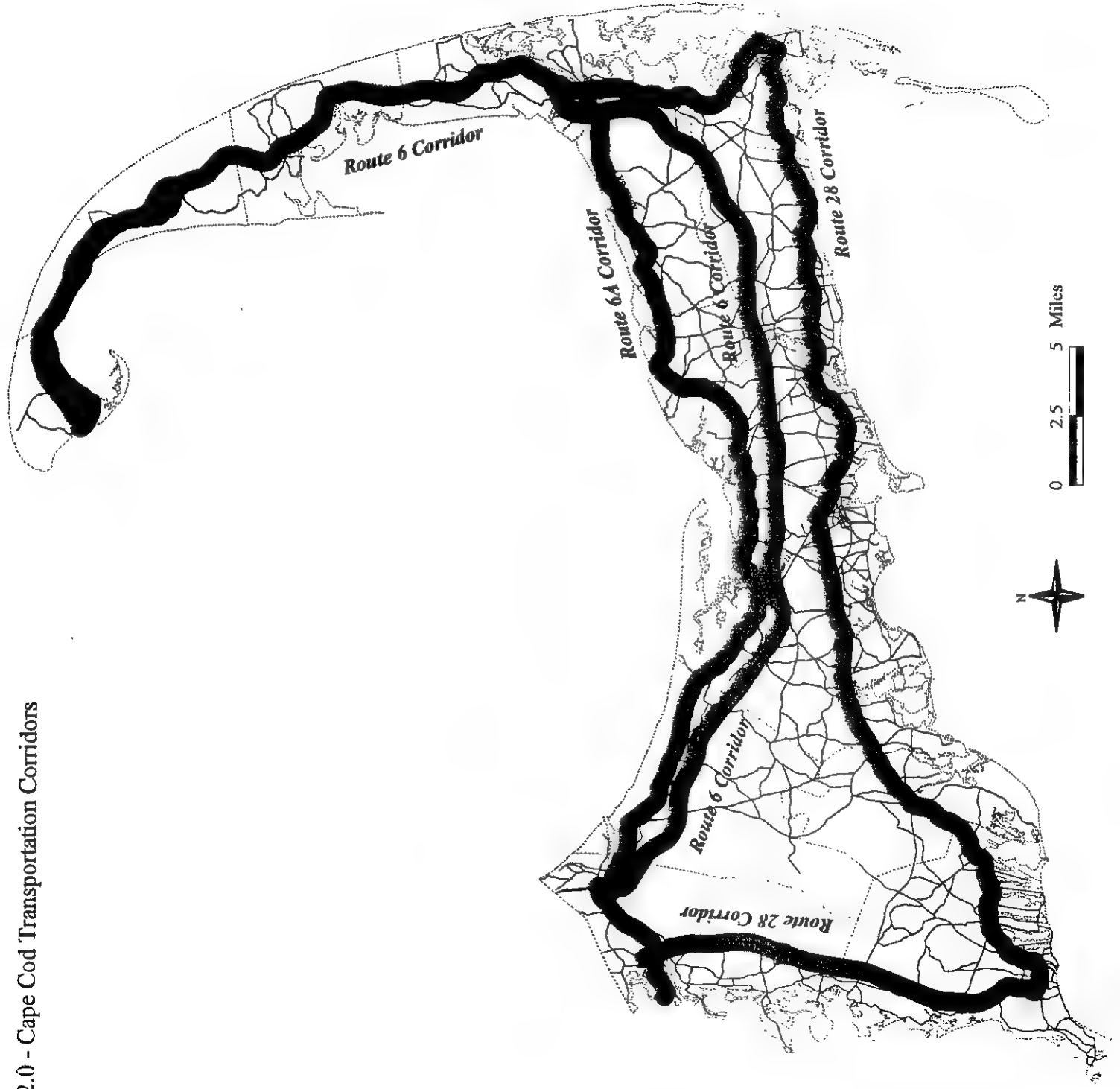
In this chapter we set the stage for dealing with the transportation issue. The following sections describe the geographical perspectives used in looking at the Cape as well as providing background on the people and place that have the needs and purpose for travel. The final section in this Chapter describes the technique used which makes use of these inputs in estimating travel demand.

2.1. - Study Areas and Corridors

Information is organized into three different perspectives. Transportation issues are detailed in the next chapter, however these perspectives are introduced in this chapter since they are useful for the discussion of this chapter. The first, "To and From the Cape," addresses the relationships between Cape Cod and major off-Cape locations such as Boston or the islands of Martha's Vineyard and Nantucket. For this perspective, the study area is focused on the Cape as a whole.

The second perspective looks at transportation issues organized by the major "corridors" - Routes 6, 6A, and 28, as well as the Cape Cod Canal area. This perspective uses the roadway system as a means to organize information. Despite the fact that automobiles are the current major component of travel on the Cape, it is logical to examine the other travel modes and land use issues in the context of major roads. The map in Figure 2.0 shows the corridors examined in this study. For a more comprehensive analysis of these corridors, see Volume I of the 1994 Long

Figure 2.0 - Cape Cod Transportation Corridors



Range Transportation Plan. Unless otherwise specified, all information is the most recent available data; traffic count information is from 1995 or 1996. Accident data is from 1990, 1991, and 1993.

The third perspective examines shorter distance travel and local issues by looking at the Cape broken up into several Sub-Regions. While specific transportation issues exist on a town-by-town or even a village basis, organizing by Sub-Regions is a practical way to explore them. Figure 2.1 shows the four Sub-Regions examined in this study.

2.2. - The People

The most notable thing about the people of Cape Cod is how many more of them there are today than in the past. The year-round population of the Cape has continued to rise, from less than 100,000 in 1960 to 148,000 in 1980 to almost 200,000 in 1994. According to estimates by the Massachusetts Institute for Social and Economic research (MISER), growth has been strongest in Mashpee, Sandwich and Barnstable, while only Chatham has experienced an estimated drop in population from 1990 to 1994 (see Table 2.0). However, these numbers in all likelihood underestimate population in the future since they do not adequately allow for migration into the region.

This rise in population is projected to continue. According to MISER estimates, the Cape's year-round population will be 205,400 in 2000 and 223,204 by 2015.

Figure 2.1 - Cape Cod Subregions

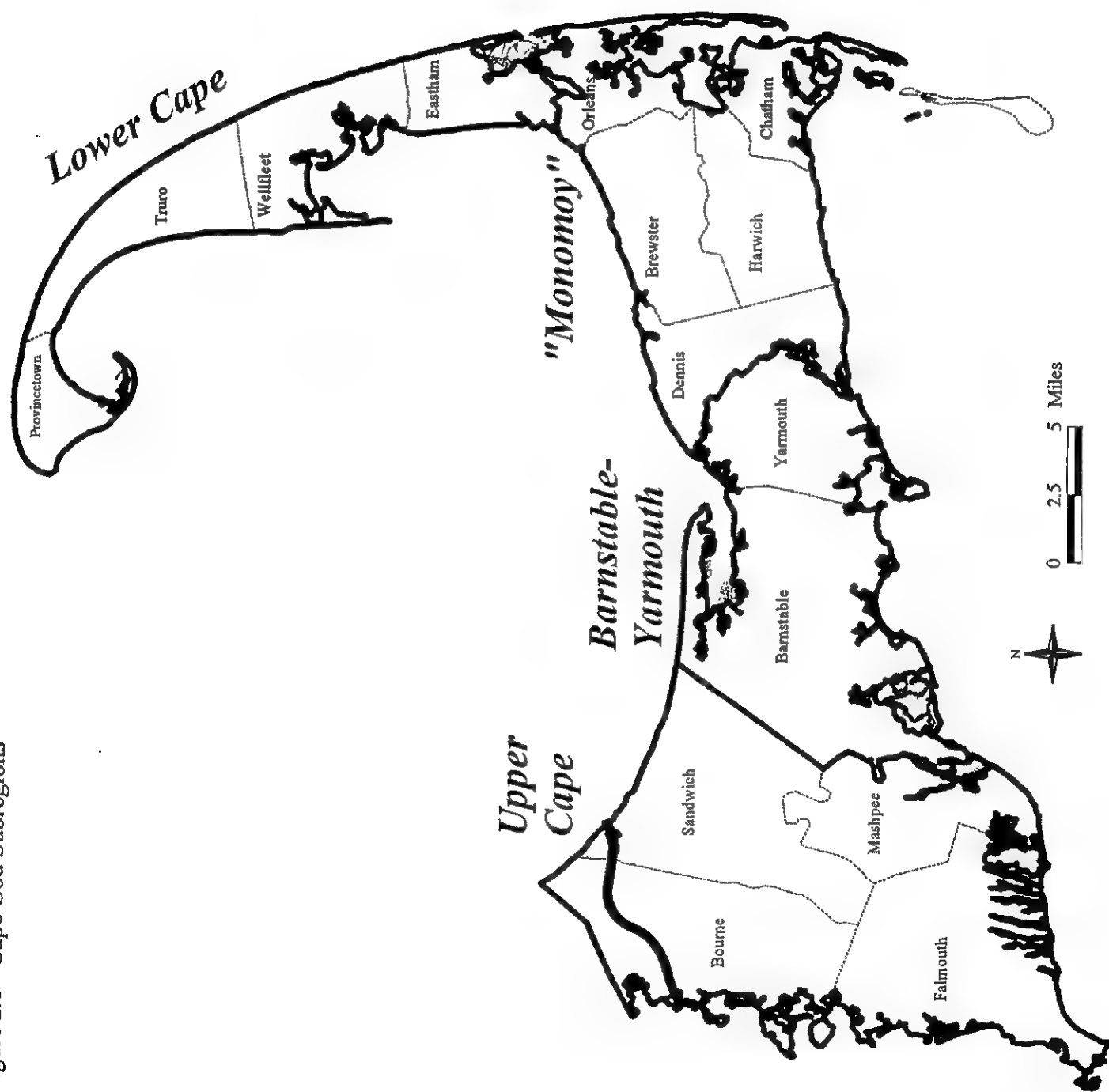


Table 2.0 - Barnstable County

Population

TOWN	1980 CENSUS	1990 CENSUS	1980-90		Estimate 1994	1990-94	
			DIFFERENCE	% CHANGE		DIFFERENCE	% CHANGE
BARNSTABLE	30,898	40,949	10,051	33%	42,579	1,630	3.98%
BOURNE	13,874	16,064	2,190	16%	16,646	582	3.62%
BREWSTER	5,226	8,440	3,214	62%	9,242	802	9.50%
CHATHAM	6,071	6,579	508	8%	6,269	-310	-4.71%
DENNIS	12,360	13,864	1,504	12%	13,945	81	0.58%
EASTHAM	3,472	4,462	990	29%	4,639	177	3.97%
FALMOUTH	23,640	27,960	4,320	18%	28,949	989	3.54%
HARWICH	8,971	10,275	1,304	15%	11,080	805	7.83%
MASHPEE	3,700	7,884	4,184	113%	9,540	1,656	21.00%
ORLEANS	5,306	5,838	532	10%	5,864	26	0.45%
PROVINCETOWN	3,536	3,561	25	0.71%	3,587	26	0.73%
SANDWICH	8,727	15,489	6,762	77%	17,755	2,266	14.63%
TRURO	1,486	1,573	87	6%	1,671	98	6.23%
WELLFLEET	2,209	2,493	284	13%	2,685	192	7.70%
YARMOUTH	18,449	21,174	2,725	15%	21,727	553	2.61%
COUNTY TOTAL	147,925	186,605	38,680	26%	196,178	9,573	5.13%
MASSACHUSETTS	5,737,037	6,016,425	279,388	5%	6,041,123	24,698	0.41%

Resident population may be underestimated, as Cape residents who spend part of the year elsewhere and use off-Cape addresses for Federal income tax or Medicare may not be considered Cape residents, and in-migration of new residents may be underestimated. Chatham, for example, counted 6,391 residents aged 17 and over in the town's annual census in 1994, suggesting underestimation by the U.S. Census Bureau.

Source: U.S. Census of Population, 1980, 1990; U.S. Census Bureau population estimates, 1994 (issued September 1995)

Meanwhile, the summer population also continues to grow. Estimates put the summer population in 1990 at between 447,000 and 536,000. Lower Cape towns experienced the largest influx of summer residents, while Upper and Mid Cape towns experienced less seasonal population fluctuations.

Although much of the increase in population is due to the arrival of retirees, much of it is also due to an increase in working-age population, particularly those aged 35 and up. According to the U.S. Census, the only age segment to experience an actual drop in population between 1980 and 1990 was those aged 10 to 19 (from 21,948 in 1980 to 19,730 in 1990). Also according to the Census, the median age of Barnstable County residents is estimated to have risen from 37.1 in 1980 to 39.5 in 1990.

Meanwhile, the diversity of the Cape's population continued to increase, albeit from a small base. From 1980 to 1990, the minority population of the Cape increased 53 percent, from 5,648 to 8,649. Much of that increase occurred in the "urban core" of Barnstable and Yarmouth, although towns such as Sandwich and Falmouth also experienced an influx of minorities.

In addition, the median household income of the Cape declined from 1980 to 1990 relative to Massachusetts as whole. While statewide, median household income increased 110 percent in that time, the median household income of the Cape increased 104 percent. However, this figure differed dramatically from town to town. While Brewster's median household income increased 129 percent, that of Orleans only increased 79 percent.

Seasonal employment is a major factor on the Cape, with County-wide unemployment declining from over 12 percent in January 1995 to less than 5 percent in July 1995. These numbers are similar for other years, although also

affected by the business cycle. Of those who are working, less Cape residents derived their income from a wage or salary than in the state as a whole in 1990. Only 67 percent of all households on the Cape reported earning wages or a salary, as opposed to 78 percent of the state as a whole.

A significant number of those living on the Cape also work in the county. According to 1990 Census, of the 81,779 Cape residents working, 71,333 work on Cape. 10,350 work outside the county. Of these, over 2,000 people work in the city of Boston. Cape towns with the largest employment were Barnstable (with 23,000 jobs) and Falmouth (with 13,000 jobs).

From 1970 to 1990, the population of the Cape nearly doubled and on-Cape jobs nearly tripled.

2.3. - Land Use

As mentioned in one of the Cape's regional transportation goals, land use causes transportation needs, which in turn cause new land uses. Land use patterns on the Cape have changed in the last 50 years from a village-centered pattern of relatively dense development in centers surrounded by little or no development, to a suburban-style of subdivisions and strip malls. Such changes have transportation implications; and future land use patterns will both be affected by future transportation improvements and will create the need for new improvements.

2.3.1. - Where we are

Land use on Cape Cod is dominated by housing and open space. According to tax assessor's data collected from 1988 to 1996, 38% of land on Cape Cod (excluding Camp Edwards and Otis Air Force Base) is used for housing, while 26% is open space or recreational land. An additional 30% is publicly-owned land, of which much is

open space. Less than 3 percent is used for employment.

Housing is not only the most common land use on Cape Cod; it is also the one that is growing the most quickly. As population grows, so does the need for places to live. In a region such as Cape Cod, that tends heavily toward single-family detached housing, this population growth translates into an increase in the use of land for housing. The housing density on the south shore and Buzzard's Bay coastline is greatest. Outer Cape development is more dense in Provincetown and Eastham than the rest of the region. Generally, lot sizes are largest on the Cape Cod Bay side of the Cape. Multifamily housing units are concentrated in certain areas, such as Hyannis, Wellfleet Center and Dennisport. Other areas, such as Sandwich and Barnstable Village, are almost devoid of multifamily housing units. Falmouth, Yarmouth, Dennis, Chatham and parts of Barnstable are the "year-round core" of the Cape, where the population is still significant in the off-season. Meanwhile, Truro, Wellfleet, Eastham, and Brewster are far less densely populated, revealing the seasonal nature of their housing stock at present.

In a seasonal region such as Cape Cod, lodging units also play an important role in regional transportation planning. Lodging is somewhat clustered in certain block groups, such as those in Provincetown, in Chatham, and in Brewster. There are also significant amounts of lodging land uses along the south shore of the Cape.

Commercial and industrial land use varies by specific type, although generally they are more common uses on the Upper Cape than elsewhere:

- Office Uses: Office land uses are concentrated in Provincetown, Eastham, Chatham, Falmouth, Bourne and the Route 28 corridor from Hyannis to Dennis. To a lesser extent there is also office use along Route 132 and Route 6A in Sandwich.

- **Retail Uses:** Retail uses are more dispersed, although there is still a concentration along Route 28 from Hyannis to Dennis and Routes 132 in Hyannis, Route 28 in Bourne and Route 134 in Dennis.
- **Manufacturing Uses:** Manufacturing largely occurs inland from Barnstable to Dennis, in Provincetown, and in Falmouth and Bourne. On the whole there is not a large amount of manufacturing on Cape Cod.
- **Mining:** Mining is also not widespread on Cape Cod, although there is some mining in Falmouth and other locations. Much of the mining on the Cape occurs inland.

At present, a significant percentage of the land on Cape Cod is devoted to preservation as open space, recreational land, or public land. In addition, the Cape Cod National Seashore on the lower Cape not only preserves a great deal of land in that area, but also restricts the development of land already developed within its borders.

Generally, open space uses are common inland and on the lower Cape, while not as common on the south shore of the Cape. The Cape Cod Bay and Buzzards Bay shores fall somewhere in between. The one area that appears to suffer from a lack of open space uses is the south shore of the Cape from Hyannis to Harwich, where development pressures have been strong. On the rest of the Cape open space is generally not hard to find, at present. Whether this condition will continue depends on the development and transportation policies adopted by the region and its towns in the future.

2.3.2. - Where we're headed

Development pressures have been great in this region for the past 40 years and are likely to continue to be great in the future. Between 1971 and 1990 the amount of

land used for residences increased by over 50%. Similarly, commercial uses increased significantly from 1971 to 1990.

According to land use projections conducted for the *1994 Long Range Transportation Plan for Cape Cod*, residential uses will continue to be developed at a significant pace. Commercial development will also continue in the future, at an even more rapid pace than residential development. However, since amount of land involved is not as significant, the impact on the land use of Cape as a whole will not be as great. These findings are summarized in Figures 2.2 through 2.4.

These land use projects are based on population and employment growth projections. They ignore some important facts about the nature of land development and transportation. One is that land use is strongly affected by changes in the transportation system. Another is that land that is considered useful for development is often environmentally sensitive. As land is developed, the use of the transportation system increases as people travel to or from new development.

Any transportation improvements made in the future will not simply help accommodate new growth; it will also likely create more growth in that region. Standard travel demand forecasting does not allow for this interaction. While some newer travel demand forecasting packages do allow for this interaction, there is no guarantee that their predictions are accurate.

A great deal of land on the Cape is also considered environmentally sensitive (see section 2.4.1). This land must be treated carefully in any future development scenario; much of it should not be developed at all, while much of it can only be used for certain types of development.

Figure 2.2 1971 Land Use on Cape Cod

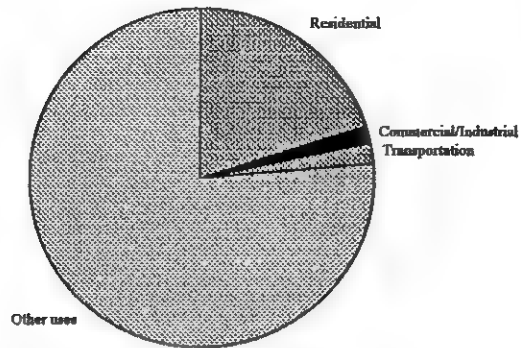


Figure 2.3 1990 Land Use on Cape Cod

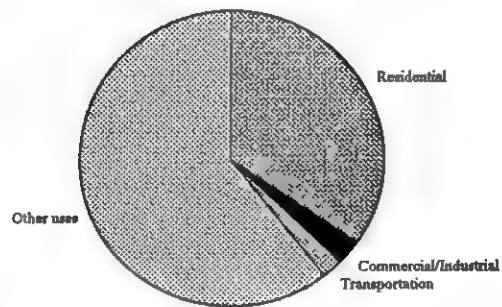
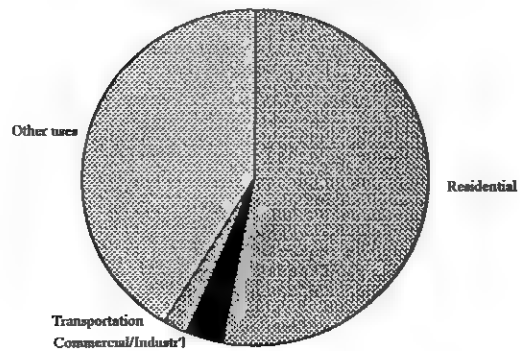


Figure 2.4 2020 Projected Land Use on Cape Cod



Source: 1971 and 1990 MacConnell Land Use Data, Cape Cod Commission staff land use projections

2.4. - Regional Issues and the Regional Policy Plan

Transportation makes up an important part of Barnstable County's Regional Policy Plan. The Regional Policy Plan is an expression of the shared aspiration of Cape Codders for the future. It recognizes the Cape as a fragile and beautiful place. It is a Plan that seeks to protect habitat, in the awareness that Cape Cod is home to endangered species of global significance. It is a Plan with a goal to conserve a cultural landscape shaped slowly over 10,000 years of human habitation.

The Regional Policy Plan includes broad goals which set the direction for future and more detailed policies for the issues of land use/growth management, natural resources, economic development, community facilities and services (including transportation), affordable housing, and heritage preservation/community character. The RPP recognizes that dealing with our traffic problems by building new or bigger roads and intersections is not desirable. Not only have such strategies failed to keep up with travel demands caused by new development, they have done so at the expense of the environment and natural beauty of the Cape. Furthermore, increasing capacity for cars does little to improve transportation for young people, for the elderly that may prefer not to drive, for those people who cannot afford a car, or for others who do not drive. Two RPP issue areas are discussed in the following sections.

2.4.1. - Environmental Concerns

Figure 2.5 shows a composite of some of the natural resources on Cape Cod. The shaded area includes:

Unfragmented Forested Habitat

Water Bodies and Land within 300' of their Shore
350' Buffer of Vernal Pools
Salt and Inland Wetlands
Public Water Supply Wellhead Protection Areas
Potential Public Water Supply Areas
Rare Wetland Wildlife Habitat and Priority Sites for Rare Species and Natural
Communities from NHESP and from Association for Protection of Cape Cod
Critical Upland Areas

2.4.2. - Scenic and Historic Concerns

The shaded area of Figure 2.6 shows the following historic features:

National Register Historic Districts
Local Historic Districts
Old Kings Highway Regional Historic District

The cross-hatched area shows Scenic Landscapes designated by the Massachusetts Department of Environmental Management. Sites on the National Register are also indicated.

2.4.3. - Energy Use and Conservation

The 1992 Census of Retail trade shows that gasoline service stations in Barnstable County had sales over \$132 million. This corresponds to 4.4% of the statewide total of \$3 billion.

Regional Policy Plan Cape Cod Significant Natural Resource Areas

The categories of land considered as Significant Natural Resource Areas include unfragmented forested habitat, water bodies and land within 300 feet of their shore, 350 foot buffer of vernal pools, salt and inland wetlands, public water supply wellhead protection areas, potential public water supply areas, rare wetland wildlife habitat and priority sites for rare species and natural communities from NHESP and from APCC, and critical upland areas.

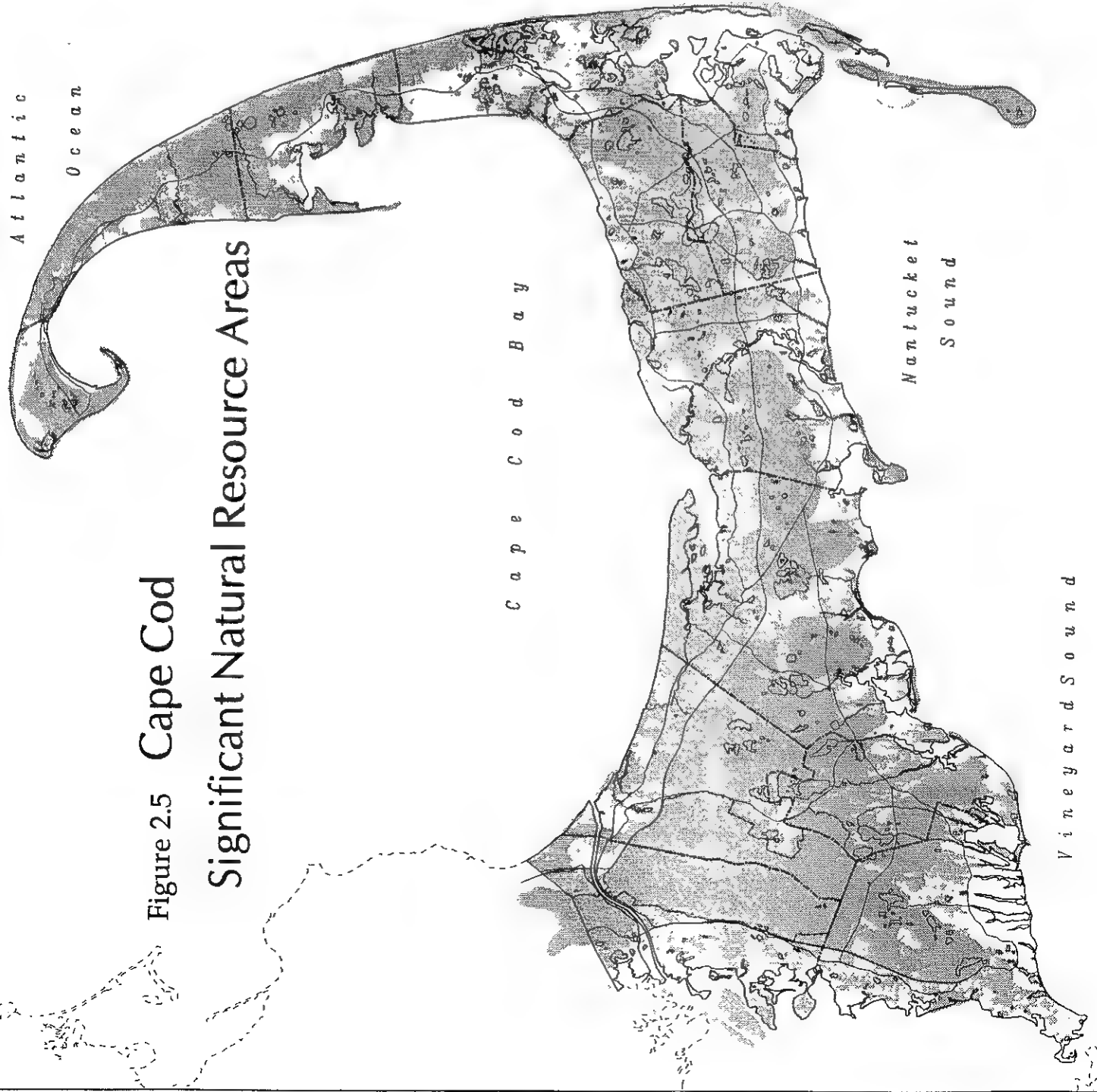


Figure 2.5 Cape Cod
Significant Natural Resource Areas

Massachusetts State Planning Office
Map of Cape Cod
Scale: 1 inch = 10 miles

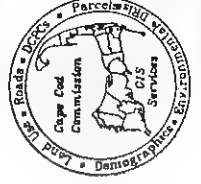
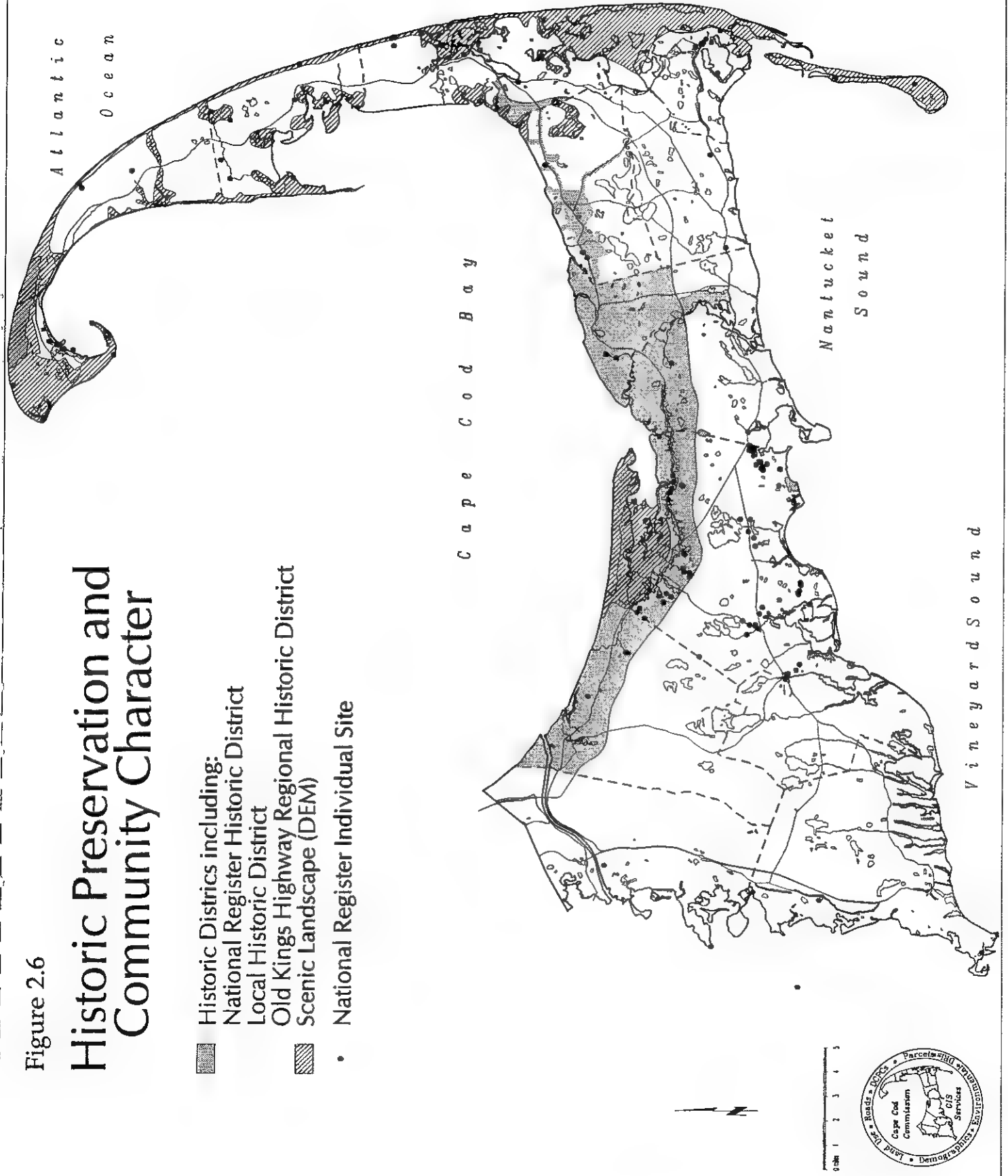


Figure 2.6

Historic Preservation and Community Character

- Historic Districts including:
 - National Register Historic District
 - Local Historic District
 - Old Kings Highway Regional Historic District
 - Scenic Landscape (DEM)
- National Register Individual Site



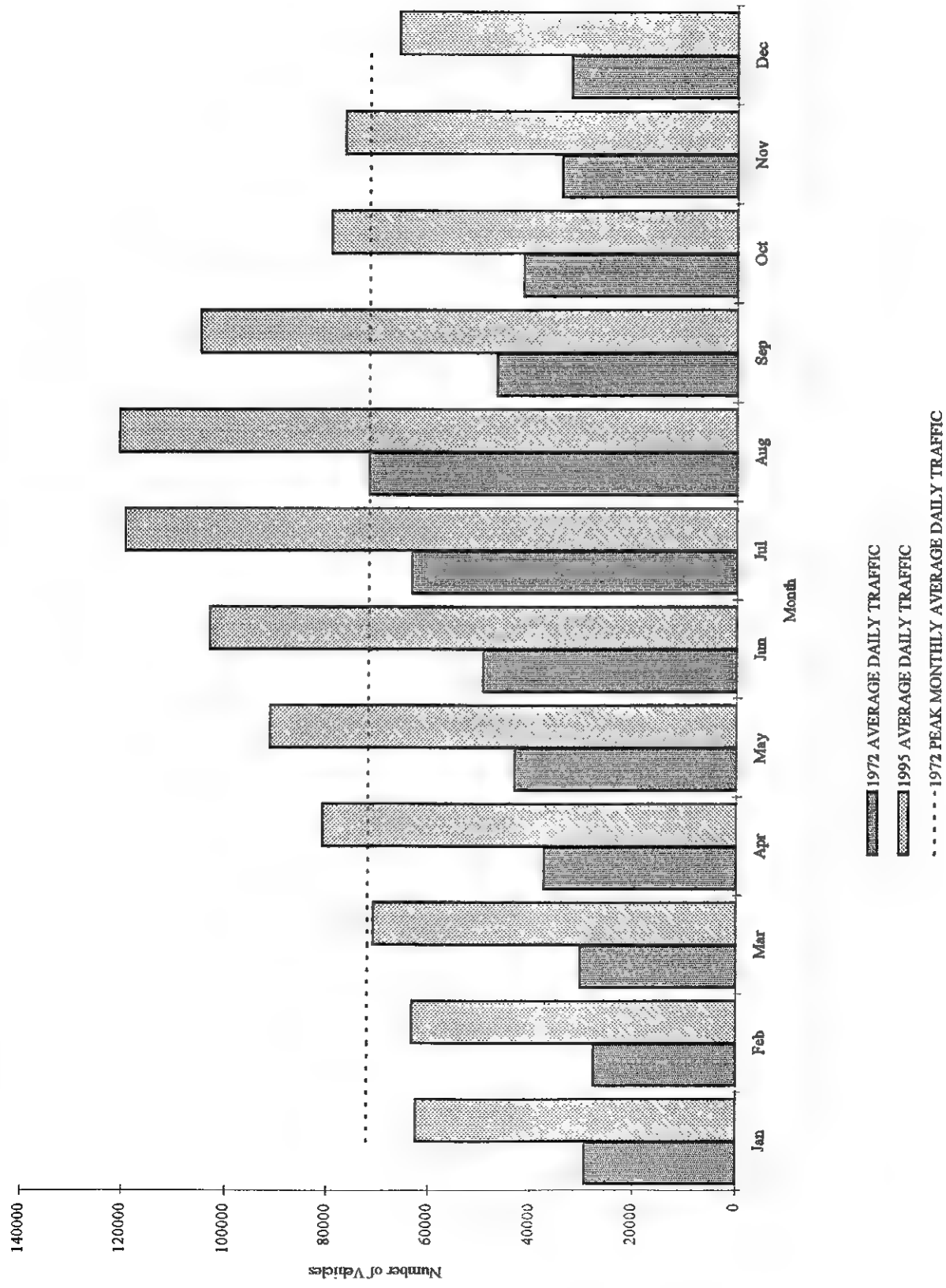
2.5. - Demand for Travel

Travel on Cape Cod has two main components, year-round and seasonal.

Year-Round Travel: Like most regions, there is travel by year-round residents to and from work and for shopping and social trips. As the Cape's year-round population continues to increase, this component of travel on the Cape will increase as well. This travel is easier to understand and analyze, since it represents travel for specific purposes and at fairly regular intervals.

Seasonal Travel: A second, and significant, amount of travel, is created by tourists and part-year residents. This travel is often to recreational areas such as beaches, although some of it is also spent on trips to and from shopping, social events, and work. Although most of this travel used to occur in the summer, in recent years it has also been increasing in the "shoulder seasons" of the spring and fall. In the past 23 years, the number of trips across the Canal bridges in these shoulder seasons has increased by 52 percent, as opposed to a 46 percent increase in the peak summer months, likely reflecting the travel trends of tourists and part-year residents. As seen in Figure 2.7, 1995 average daily traffic across the bridges exceeded the level experienced in August 1973 from April through November.

Figure 2.7 - Average Daily Crossings at the Bourne and Sagamore Bridges, 1972 and 1995



2.5.1. - Methodology and Assumptions

Understanding and predicting demand for travel on Cape Cod is not easy. Unlike many other regions, many of the trips are not to work or shopping, but instead travel for travel's sake. How do you predict the number of "scenic drives" that people may be making? However, by integrating traditional travel demand forecasting with some adaptations for seasonal travel we are able to make some observations about current demand and predicted demand for the future. It should be noted up front, however, that like most travel demand models, ours is not able to study the effects on land use that transportation improvements create. For this reason, our analysis in this section is limited to a study of future travel demand on our *current* road system. In addition, we have made some basic assumptions about future development:

- We assume that year-round and seasonal residential in the future will continue along the trend lines of the last 15 years. In most areas this means growth will occur. In certain areas, such as the tip of Provincetown, this trend has been flat or even of a decline in housing stock.
- We make the same assumption for commercial, industrial and retail development, with similar results.
- We have also made the same assumption for hotels, motels and campgrounds. However, since there has been little or no net growth in these land uses in the past 15 years the result has been to hold these uses constant in future scenarios.
- We have assumed no net gain of parking spaces available at beaches.
- Finally, for the winter scenarios we have assumed a "low demand" case, in which no seasonal housing is occupied and only 10 percent of parking spaces at beaches are likely to be used.

Transit, bicycling and walking are feasible options to automobile travel in many instances on Cape Cod, particularly in the "urban core" along the south shore of the Cape. However, most of the observations in this section are of demand for automotive travel, whether single occupant vehicles, carpools, or freight transport, since the roadway system is currently under far more stress than these other systems. This does not mean that they will not play a role in alleviating observed roadway congestion, however, as is discussed in the sections on proposed solutions to projected congestion.

2.5.2. - Current Conditions

At present, traffic on Cape Cod is mildly congested most of the year but experiences times of extreme congestion in the summer. This difference is due to the addition of the aforementioned seasonal travel on top of year-round traffic. Figures 2.8 and 2.9 identifies the congested roadways on Cape Cod at present during midweek afternoon rush hour in the middle of the summer. Figure 2.10 shows the same information for the slowest time in the winter. The contrast is obvious, and another sign of how travel demand shifts dramatically based on the level of tourist and seasonal traffic present.

Roads that experience year-round congestion at present include:

- Route 28 from the Mashpee Rotary to West Main Street in Hyannis
- Route 28 from East Main Street in Hyannis into West Yarmouth
- Route 132 from the Airport Rotary up to Independence Park Drive
- Cape Cod Canal Bridges

Figure 2.8 - 1996 Summer PM Peak Hour Conditions

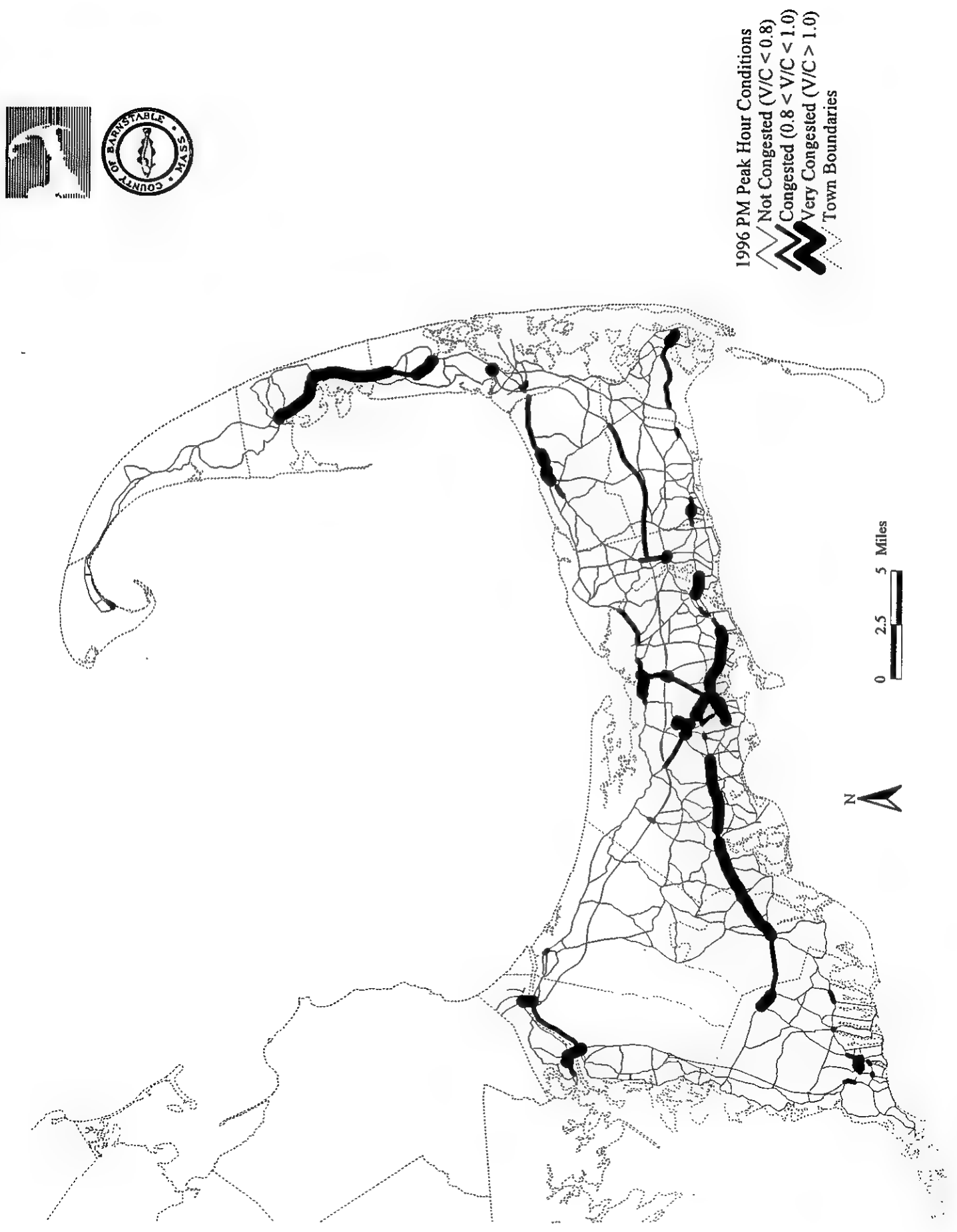


Figure 2.9 - 1996 Summer PM Peak Hour Conditions in Hyannis

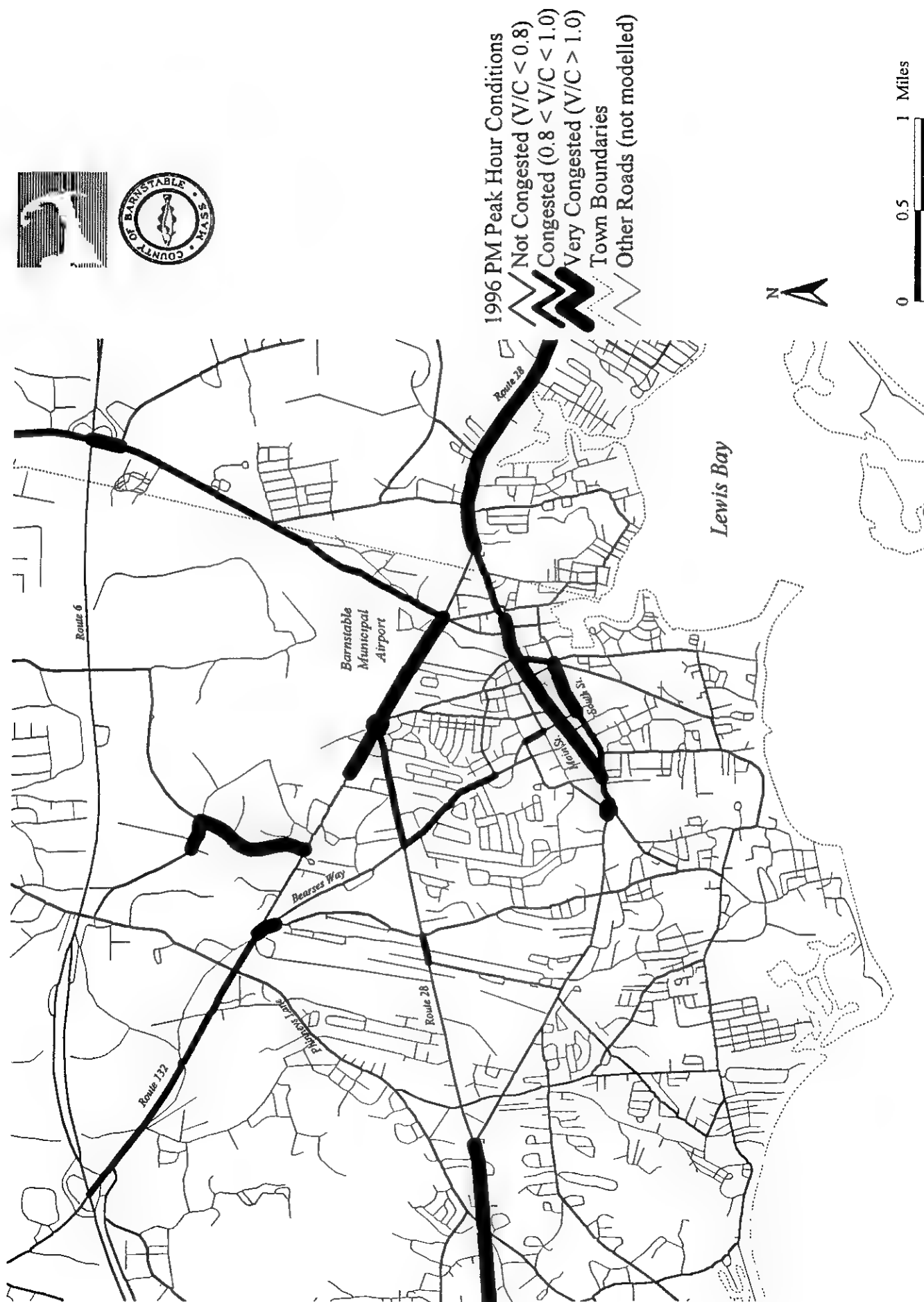
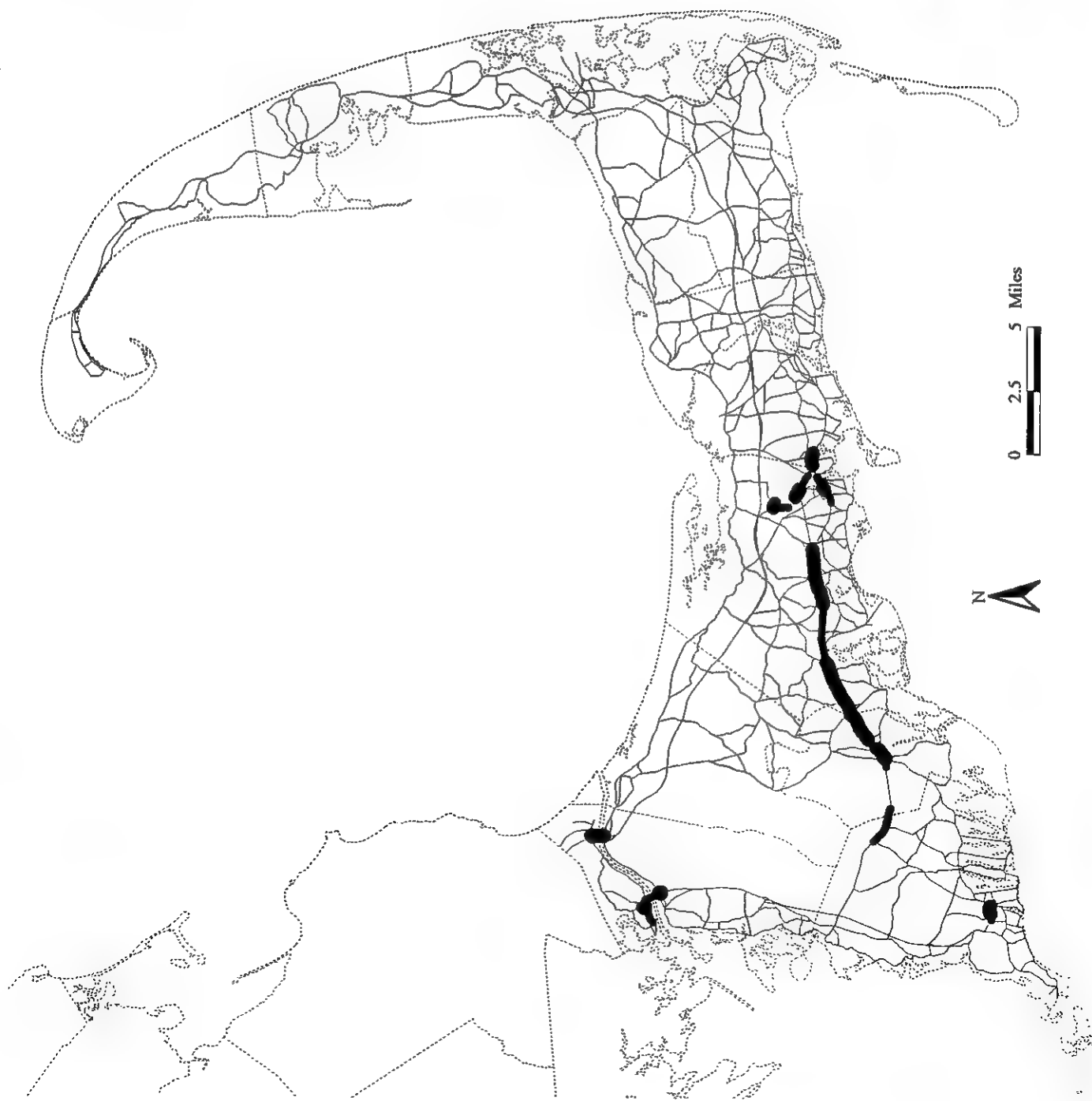


Figure 2.10 - 1996 Winter PM Peak Hour Conditions



1996 Winter PM Peak Hour Conditions
Not Congested ($V/C < 0.80$)
Congested ($0.80 < V/C < 1.00$)
Very Congested ($V/C > 1.00$)
Town Boundaries

In addition, roads that experience peak summertime congestion include:

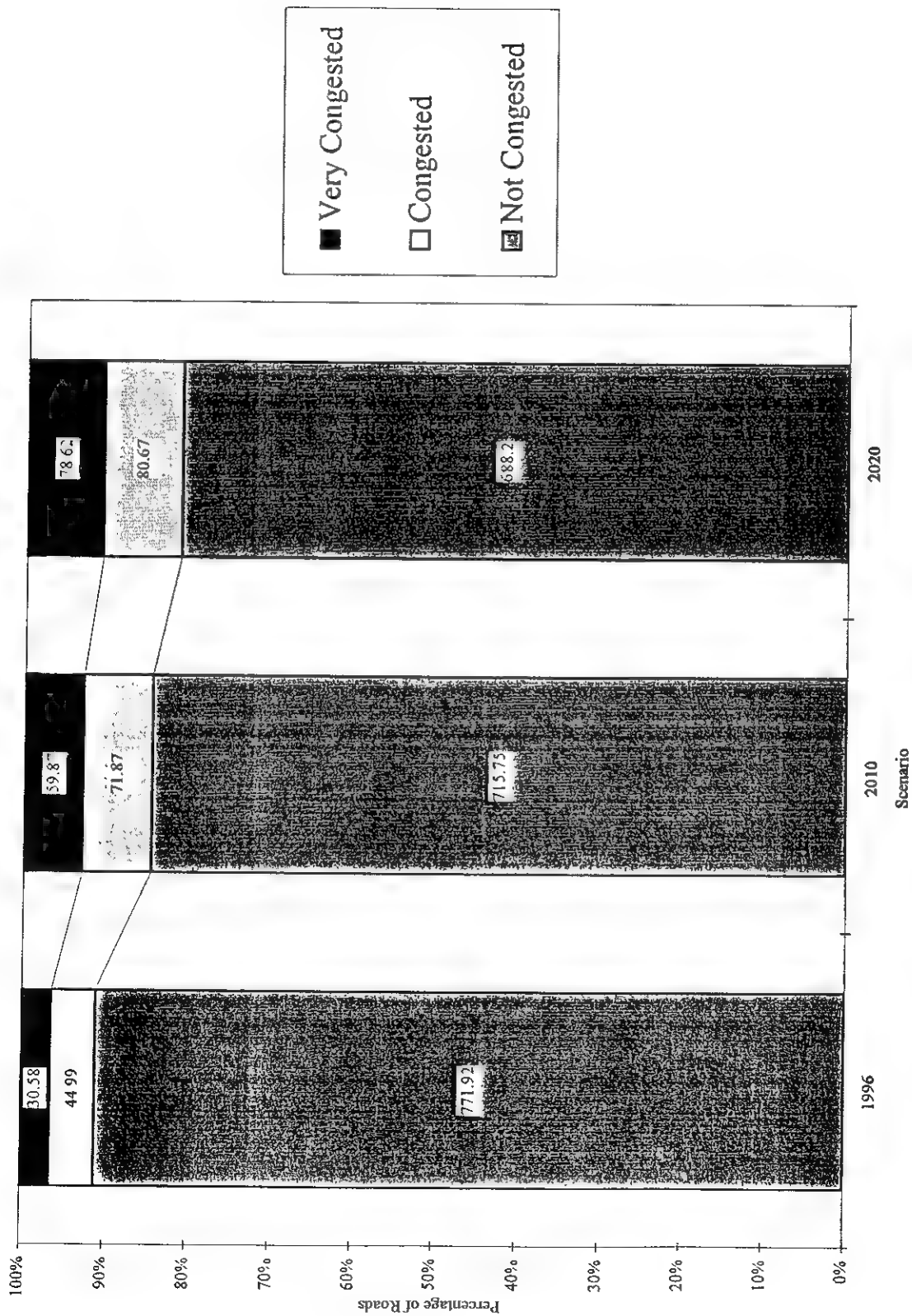
- Route 6 from Eastham to Wellfleet Center
- Route 6 in Brewster
- Route 28 west of downtown Chatham (Main Street)
- Route 6A in Yarmouthport
- Route 151 in Hatchville and Mashpee
- Route 132 from Route 6 to the Airport Rotary
- Willow Street/Yarmouth Road from Route 6 to Hyannis
- Route 6 from Exit 9 to Exit 11
- Sandwich Road along the Cape Cod Canal
- Main Street and South Street in downtown Hyannis

However, it should also be noted that, even in the summertime, the vast majority of roads on Cape Cod are *not* congested. Of the 850 miles of regional roadway modelled, the most heavily used roads on Cape Cod, over 90 percent are not congested during the summertime afternoon rush hour (see Figure 2.11). Of the remaining thousand miles of public roads on the Cape, few if any experience systemic congestion.

In addition, people are generally able to get where they want fairly quickly at present, even in the summer. The average travel speed at rush hour at present is 26 miles per hour. This speed allows the average traveller to get to her or his destination in just over 15 minutes.

At present, most local fixed-route bus services on the Cape do not experience capacity shortages. Even the relatively popular Sea Line from Falmouth to Hyannis operated at less than 60 percent of its potential capacity (32,000 passengers in 1994 with seats for 56,000). However, intercity buses, particularly those used for

Figure 2.11 - Projected Conditions of Cape Roads



commuting to Boston, are generally popular during the summer rush hour. Plymouth and Brockton service to Boston had 540,000 riders in 1994. Bicyclists and pedestrians generally have inadequate facilities on which to safely travel, since most roads on the Cape are narrow and lack significant shoulders or sidewalks.

Ferry service to Martha's Vineyard and Nantucket attracts a large number of passengers and automobiles, particularly in the summer. In 1994 there were over 2.5 million passengers on Steamship Authority ferries alone, of which an estimated 450,000 travelled in August (see Figure 2.12). Over 500,000 cars and trucks travelled in that time period. In addition, an estimated 750,000 passengers on other ferry services.

Air service has attracted a small but significant percentage of travel to and from Cape Cod. In 1992, 237,000 passengers went through Barnstable Municipal Airport, and an additional 16,000 went through Provincetown Airport.

2.5.3. - Future Scenarios

If present growth trends continue unabated, demand for travel on Cape Cod is projected to increase significantly between now and 2020, particularly in the summer months. Between 1996 and 2020, summer daily vehicle miles travelled are projected to increase from 6.3 million to 8.1 million, (see Table 2.1). In that same time period, summer peak hour average speeds are projected to decrease from 26 miles per hour to 20 miles per hour (see Figure 2.13). At the same time, summer peak hour average trip lengths are estimated to increase from 7.27 miles to 7.54 miles. In short, in the future, summer travel will take longer and be slower than at present; the average trip time will increase from 16 minutes to 22 minutes.

Figure 2.12 - Monthly Percent of Total Annual Steamship Authority Traffic by Category

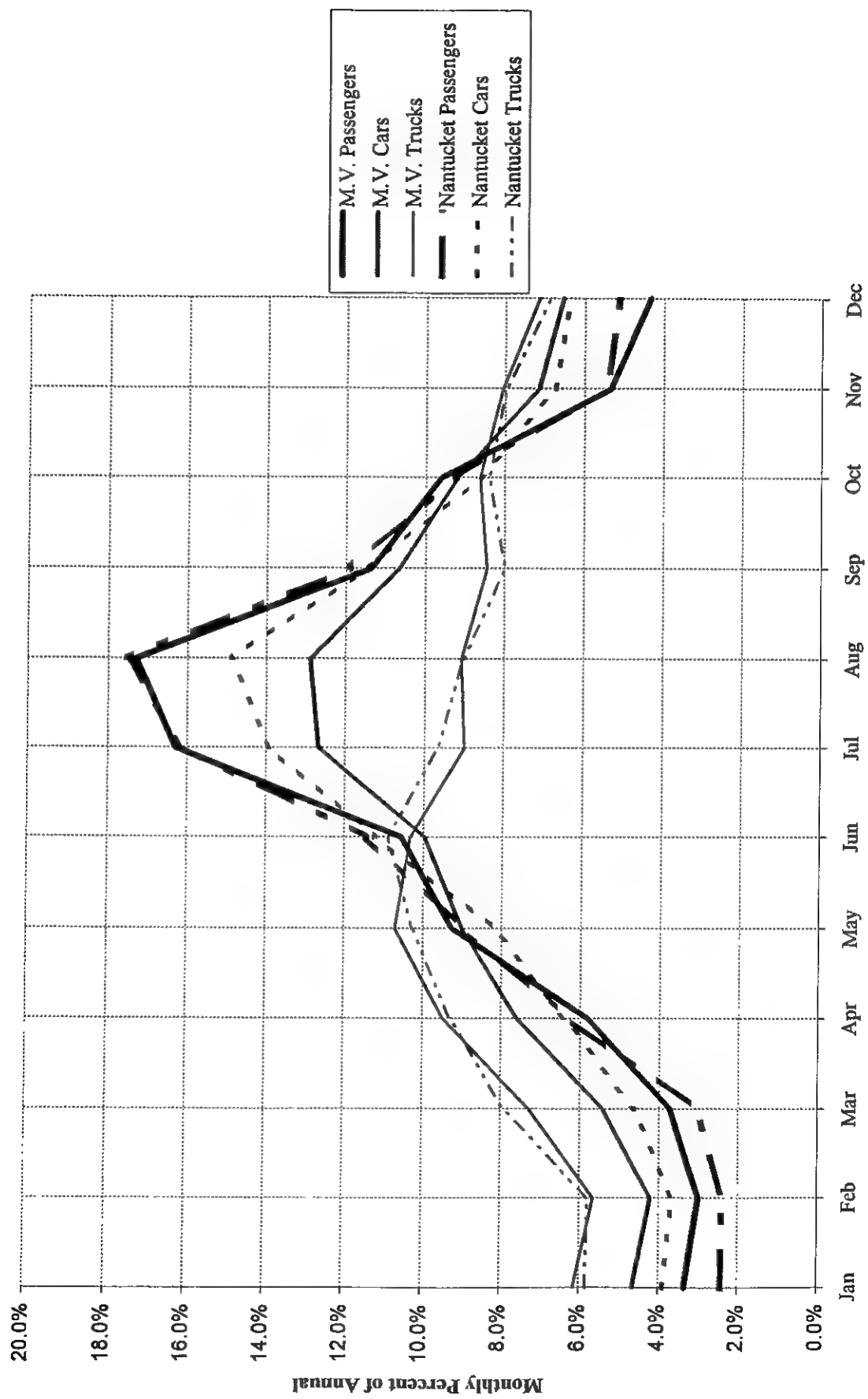


Table 2.1 - Vehicular Travel on Cape Cod

	Daily Summer	Daily Summer	Daily Winter	Daily Winter
<u>Year</u>	<u>VT</u>	<u>Trips</u>	<u>VT</u>	<u>Trips</u>
1990	5,842,382	803,520		
1996	6,344,031	874,867	3,900,005	519,684
2000	6,665,246	906,949		
2010	7,408,371	992,714		
2020	8,127,364	1,078,571	5,068,264	663,745

In the same time period, winter travel will also increase, but not as sharply. From 1996 to 2020, winter daily vehicle miles are projected to increase from 3.9 million miles to 5.1 million miles. Winter peak hour average speeds will decrease from 31.7 miles per hour to 28.5 miles per hour.

Similar trends are predicted in ferry travel from Cape Cod to the Islands. For example, annual passenger trips to Martha's Vineyard on the Steamship Authority are projected to increase 43 percent by 2005, from 2.1 million to 3.0 million. Annual auto trips are projected to increase by 24 percent in the same period, from 368,000 to 455,000. This increase will also have an effect on the roadways of Cape Cod.

Figures 2.14 through 2.17 show which roads on Cape Cod are forecast to experience afternoon peak hour congestion in 2010 and 2020 if no travel demand management strategies or roadway improvements are implemented. These forecasts project that the congested areas listed above will become more congested. In addition, the following roadways will begin to experience winter peak hour congestion:

- Route 130 from Route 6A to the Mashpee town line in Sandwich
- Route 6A in Brewster

- Route 6 from Exit 9 to Exit 10 in Dennis and Harwich

Also, the following roadways will begin to experience summer peak hour congestion:

- Route 6 in Wellfleet and Truro
- Route 6 from Exit 11 to the Orleans Rotary
- Route 6A in Sandwich
- Route 28 in Falmouth
- Bearses Way in Hyannis

However, even in the future summer scenarios, the vast majority of regional roadways are not expected to experience peak hour congestion (see Figure 2.11). In 2010, 84 percent of the roadways modelled will not experience systemic congestion even in the summer. Only seven percent of modelled roads (60 miles) will experience serious congestion. In 2020, 81 percent of modelled roads will not be congested during the summer peak hour, while 9 percent will experience serious congestion. These figures do **not** reflect the 1,000 miles of public roads that are not included in the model, the vast majority of which will not be congested in 2020.

In short, certain specific roadway segments are projected to reach capacity in the next 25 years, but the vast majority of the Cape's roads will continue to function at their current design, assuming adequate maintenance.

Of course, we do have congestion problems that need to be addressed. However, in proposing solutions we need to ensure that they truly are solutions and not simply temporary "band-aid" fixes. For example, when a road corridor is congested, often the solution proposed is to widen the roadway to the point where its design capacity is able to bear projected volumes. Sometimes this is the best solution. Often, however, increasing roadway capacity is only a temporary solution to the congestion

problem. Many times increasing the capacity of a road will simply attract more travel that would not have otherwise occurred (or may have occurred at other times or using other modes). Figure 2.19 shows the expected generated traffic on a road after its capacity is increased. It shows that, particularly in areas where demand is strong, most of the new capacity will be taken up by new traffic within 20 years. This does not include the projected increases in traffic from increased development that would have occurred regardless.

In short, solutions to congestion are being carefully considered in order to avoid spending public money needlessly. Public resources are too scarce to spend on solutions that will not be used or will not serve as solutions to identified congestion. In addition, the environmental and community character impacts of any proposal must be considered.

Figure 2.13 - Projected Average Trip Length and Travel Speeds

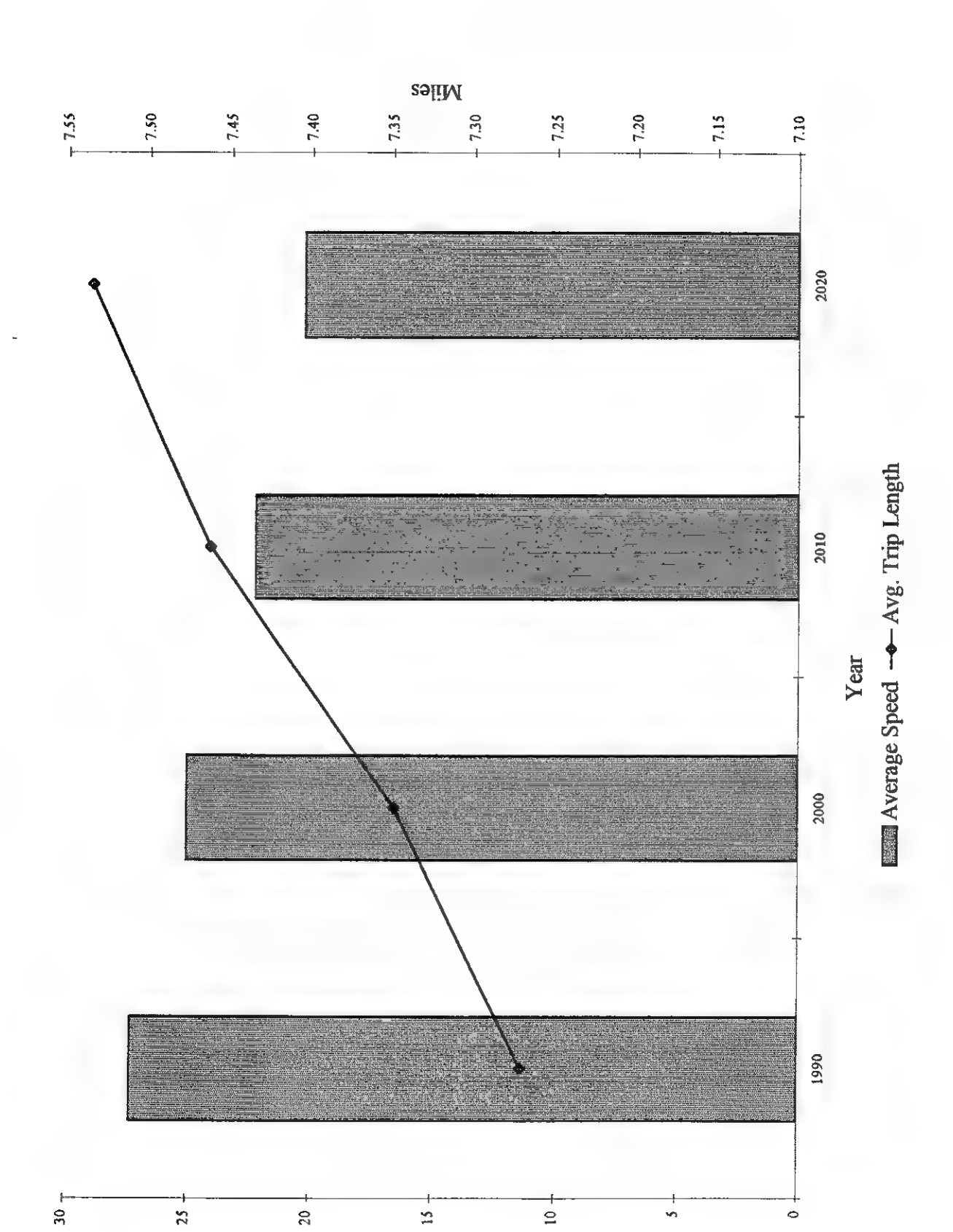
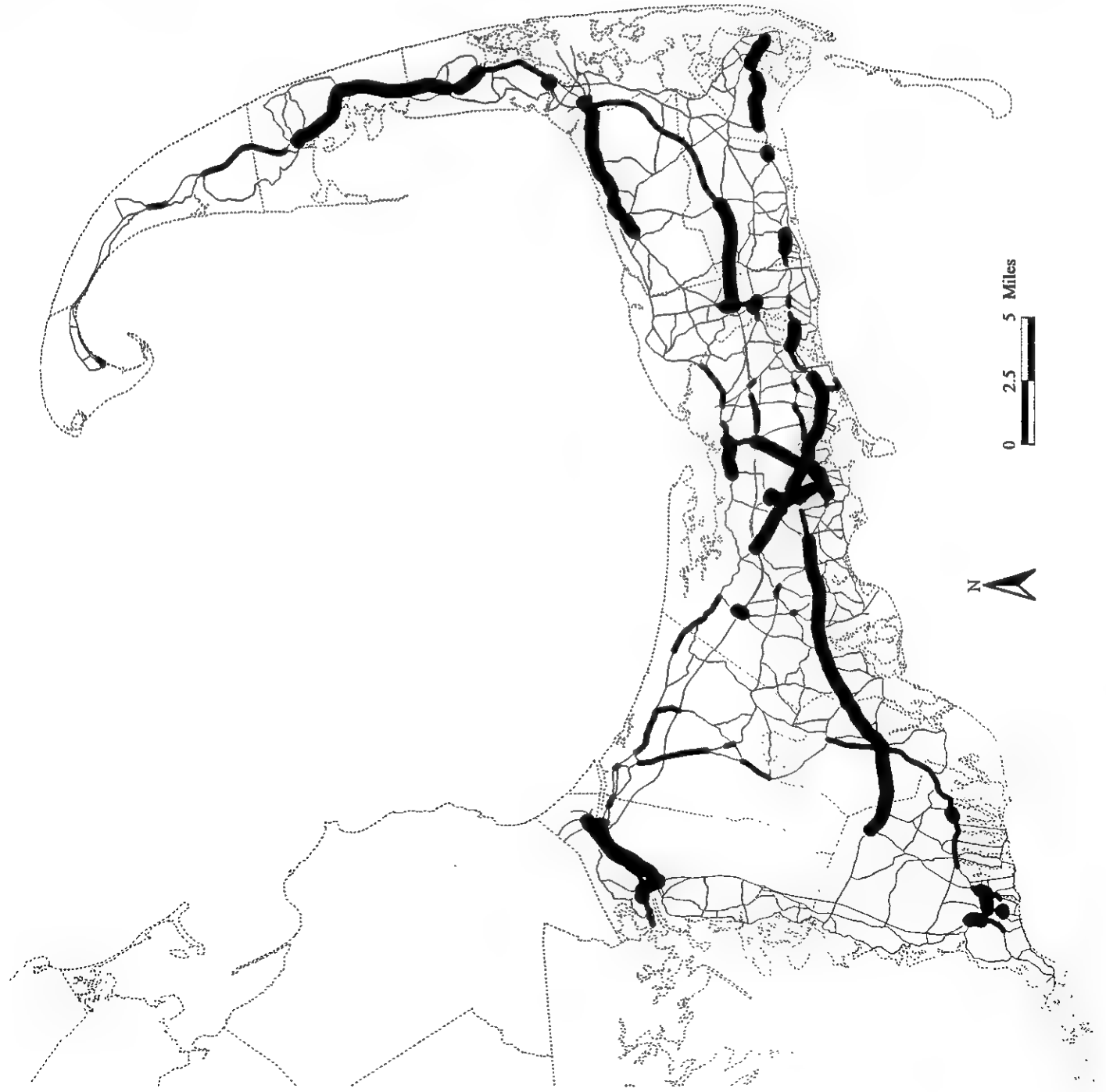


Figure 2.14 - 2010 Summer PM Peak Hour Conditions



2010 PM Peak Hour Conditions
Not Congested ($V/C < 0.8$)
Congested ($0.8 < V/C < 1.0$)
Very Congested ($V/C > 1.0$)
Town Boundaries

Figure 2.15 - 2010 Summer PM Peak Hour Conditions in Hyannis

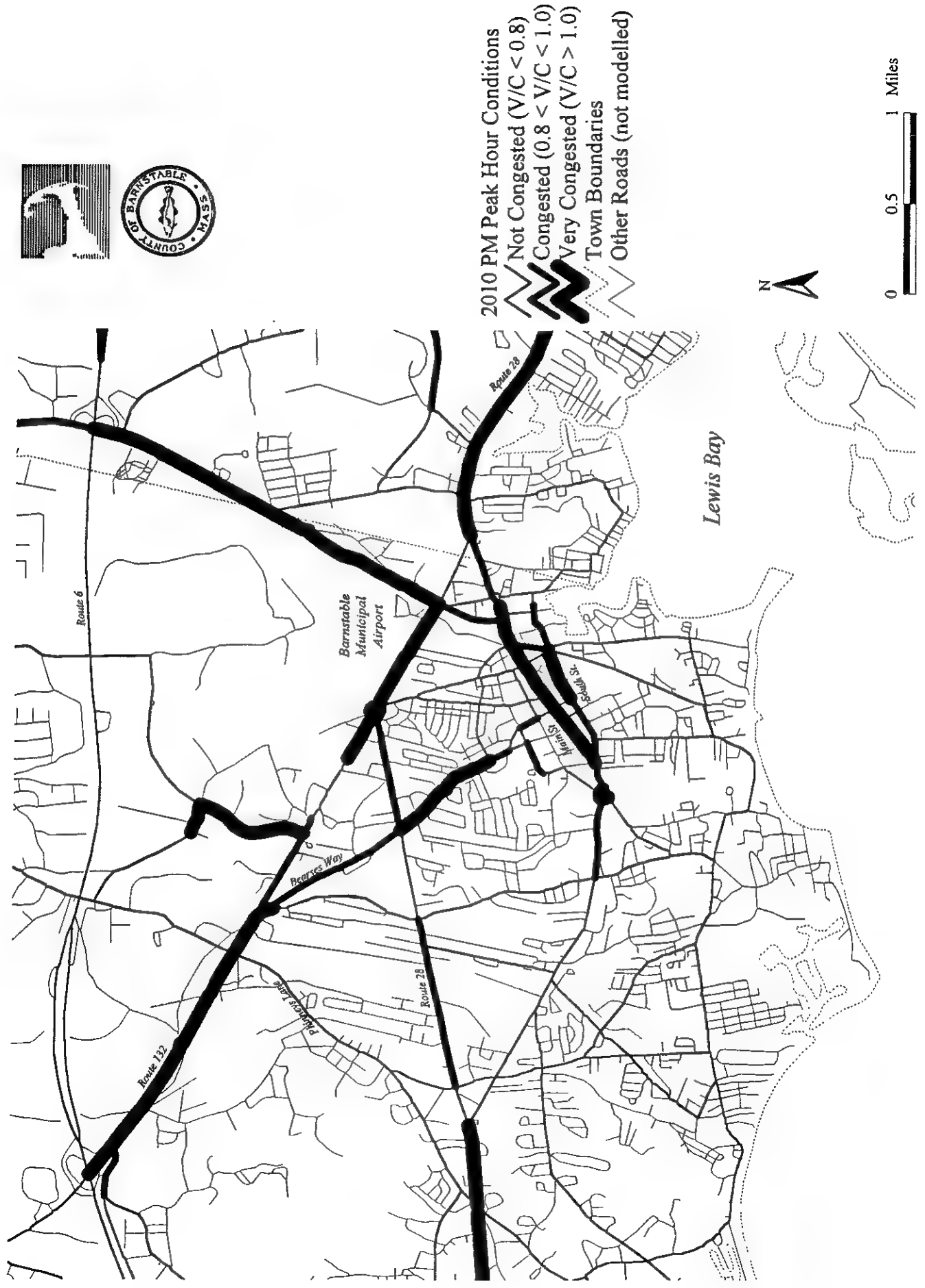


Figure 2.16 - 2020 Summer PM Peak Hour Conditions



2020 PM Peak Hour Conditions
Not Congested ($V/C < 0.8$)
Congested ($0.8 < V/C < 1.0$)
Very Congested ($V/C > 1.0$)
Town Boundaries

Figure 2.17 - 2020 Summer PM Peak Hour Conditions in Hyannis

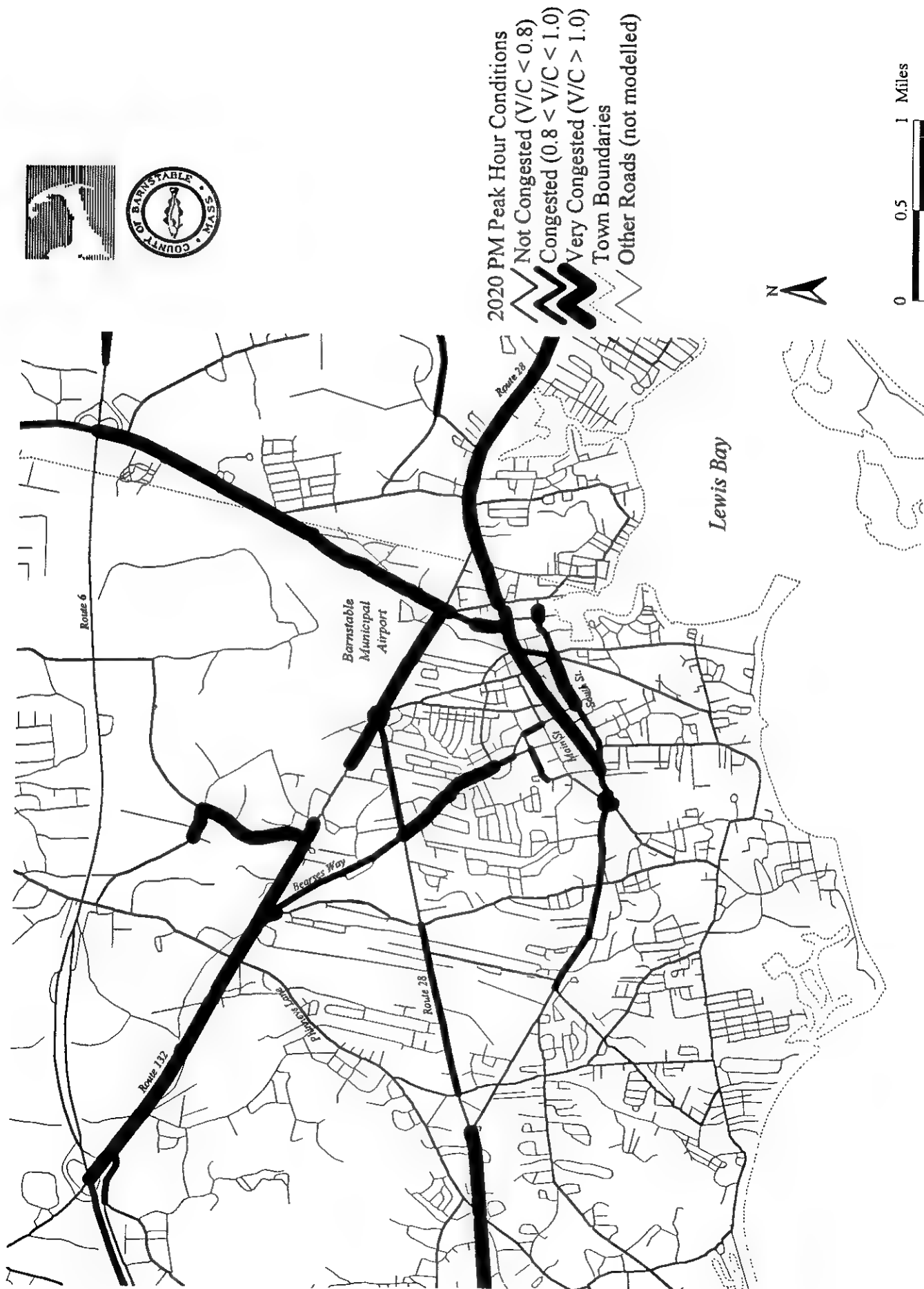
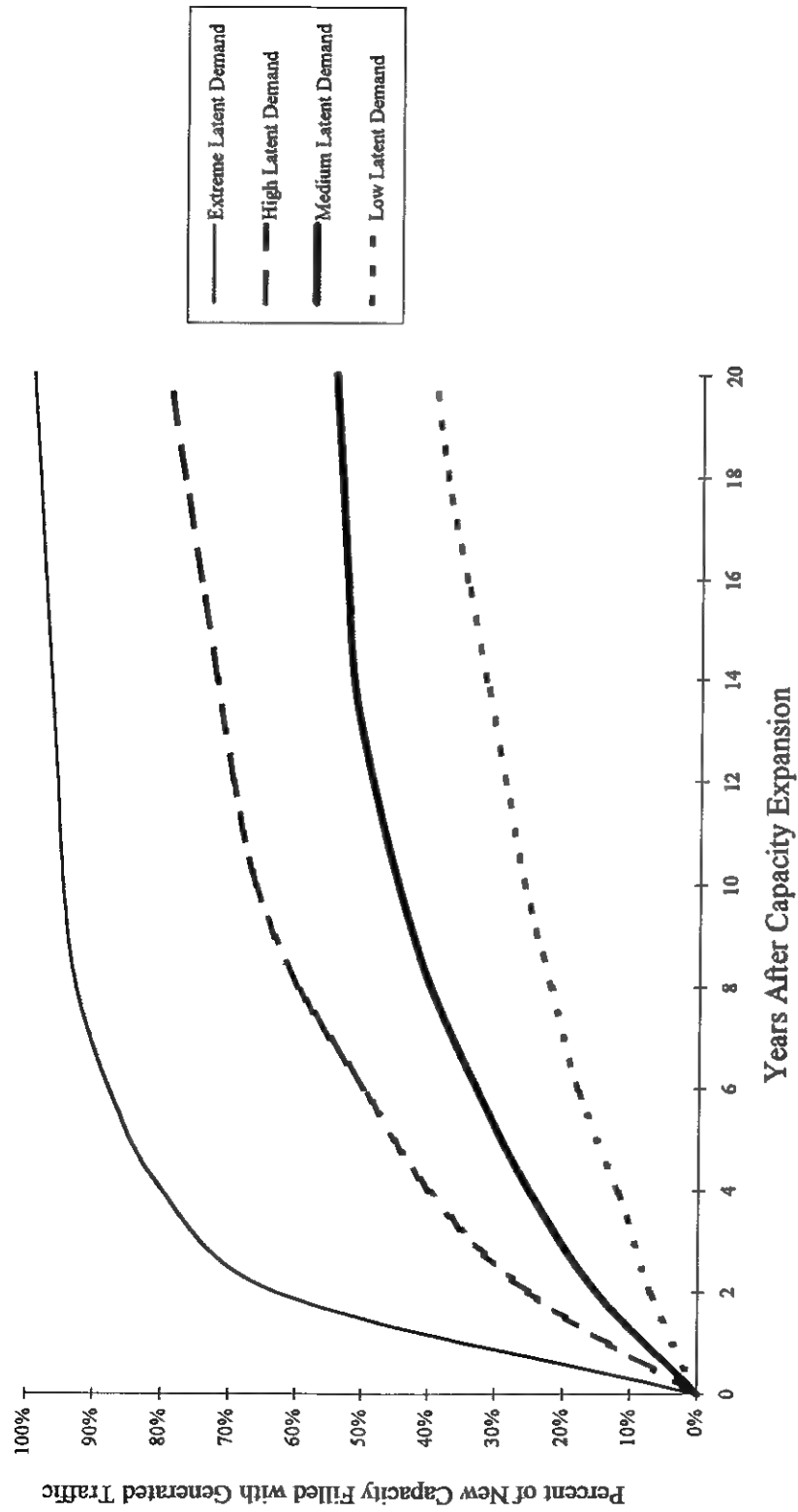


Figure 2.18 - 2020 Winter PM Peak Hour Conditions



2020 Winter PM Peak Hour Conditions
Not Congested ($V/C < 0.8$)
Congested ($0.8 < V/C < 1.0$)
Very Congested ($V/C > 1.0$)
Town Boundaries

Figure 2.19 - Estimated Induced Demand After Highway Capacity Expansion



Source: Victoria Transport Policy Institute, "Transport Cost Analysis: Techniques, Estimates and Implications", p. 5-11, 1995..

3. - The Transportation System and How it Works

The Cape's transportation system is explored by three perspectives. The first section addresses the issue of getting to Cape Cod from places such as Boston or New York. Also being considered is travel to and from the islands of Martha's Vineyard and Nantucket via Cape Cod. The study area for this perspective focuses on the Cape as a whole.

The second section looks at transportation issues organized by major "corridors" consisting of the major roadways - Routes 6, 6A, and 28. Despite the fact that automobiles are the current major component of travel on the Cape, it is logical to examine the other travel modes and land use issues in the context of major roads. The map in Chapter 2, Figure 2.0 shows the corridors used in this study.

The third perspective examines shorter distance travel by looking at the Cape broken up into several Sub-Regions. While specific transportation issues exist on a town-by-town or even a village basis, organizing by Sub-Regions is a practical way to investigate them. Figure 2.1 in chapter 2, shows the four Sub-Regions examined in this study.

3.1. - To and From the Cape

Considered geographically Cape Cod, or Barnstable County is comprised of fifteen towns in primarily linear configuration and predominately surrounded by water. Transportation access to and from the Cape may be made via any one of three surfaces: land, air or water. People utilize one or more of several travel modes including: pedestrian, bicycle, bus, rail, motor vehicle, airplane, or ferry.

3.1.1. - Land

The gateway by land to Cape Cod is the Town of Bourne whose land mass is split by the Cape Cod Canal. The western part of the Town of Bourne is connected to the adjacent region of Southeastern Massachusetts and regions beyond primarily by highways for vehicular traffic. The interregional system includes Route 3, Route 3A, Route 6, Route 28, and Route 25. These are the main roadways for linking to the interstate highway system which includes Routes 495, 195 and 95. The other ties by land are through bikeways, e.g. the Claire Saltonstall Bicycle Route--Boston to Provincetown, and rail, summer Amtrak service.

Three existing bridges--two for vehicular traffic and one for rail - hinge the western part of Bourne to the eastern part of that town and the other fourteen towns across the Cape Cod Canal. The eastern part of the Town of Bourne and the fourteen other Cape Cod towns are surrounded clockwise by water--the Cape Cod Canal, Cape Cod Bay, the Atlantic Ocean and Nantucket Sound. Entrance from other regions by motor vehicle is limited to crossing through the Town of Bourne or on the ferries from the islands.

The primary bus operators for interregional travel are Plymouth & Brockton Street Railway Company (P&B) and Bonanza Bus Lines. P&B provided 16 trips between Hyannis and Boston in the summer of 1996 during the morning (AM) peak hour. From Cape Cod Bonanza ran 2 AM peak hour trips to Providence, and 5 AM peak hour trips to Boston. These bus operators combined furnished 100 trips per weekday to and from Cape Cod to Boston and 15 trips daily to and from Providence, Rhode Island.

Most of the freight movement in New England is accomplished by trucks. According to the *Final Report New England Transportation Initiative** eighty percent of freight was moved by trucks in 1991. When compared with 1982, freight

movement in 1991 by trucks was up 37%, share of freight movement by rail was down 50%, by water down 41% and freight moved by air stayed level at one percent of the total.

A railroad connection for passengers is made by Amtrak from Providence, Rhode Island, into Hyannis in the summer months--the Amtrak train to Cape Cod arrives once per week on Friday night. The Amtrak train leaves on Sunday afternoon to return to Providence where passengers may change trains for New York or Boston. Cape Cod freight shipments by rail are made three to four times per day year round; this is primarily to transport trash to the SEMASS plant in Rochester.

3.1.2. - Air

Barnstable Municipal Airport in Hyannis and Provincetown Airport have scheduled commercial airline service. Many people are driving from off-Cape to the airport in Hyannis in order to fly elsewhere, e.g. Nantucket. The Barnstable-Yarmouth Regional Transportation Study in technical memorandum number 2, January 1993, reported "that the primary role of the Barnstable Municipal Airport is as a park-and-ride facility, serving passengers who are flying to/from Nantucket."* Other origins/destinations include Martha's Vineyard, Logan International Airport in Boston, Newark and New York.

3.1.3. - Water

Other connections are made via the water. Ferry boats transport people and goods between the Cape and Islands from Falmouth and Hyannis. Another seasonally operated ferry service carries passengers between Harwich and the Island of Nantucket. Passenger ferries also operate during the summer season between Provincetown and Boston and between Provincetown and Plymouth.

3.2. - Moving within the Cape: Transportation Corridors

Transportation is more than just counts of cars on roads. The following sections describe transportation issues facing people along and near a major road. These people may wish to travel to destinations along or near the road or to other areas of the Cape. Within each section, the discussion is focused on the needs of travelers and the opportunities for other routes and/or modes of travel. The magnitude of the current and expected transportation impact is directly related to the travel demand forecasting assumptions described in Section 2.5.

3.2.0.1. - Route 6 Corridor

Route 6 is the major transportation corridor on the Cape, particularly for those travelling long distances. From where it enters Barnstable County in Buzzards Bay until its end in Provincetown, it provides the fastest way of travelling along the spine of the Cape, both for private automobiles and for transit. The Route Six corridor in the Outer Cape also contains much of "Bike Route One," a chain of bicycle routes traversing the entire Cape.

In addition to being the main thoroughfare for the Cape as a whole, it also is the "Main Street" of several Cape towns. Buzzards Bay, Eastham, and Truro all use Route 6 as their downtown thoroughfare (although Buzzards Bay also has a Main Street Bypass designated as Route Six). This dual purpose for the road has created some conflicts for the road.

3.2.0.1.1. - Existing Conditions

Route Six has four main segments. From where it enters the county in Buzzards Bay to where it crosses the Cape Cod Canal at the Sagamore Rotary it is a two- to four-lane road with curb cuts on both sides. From the Sagamore Rotary to just after Exit 9 in Dennis, it is a four-lane limited access highway with a grass shoulder and rest areas. From Dennis to Orleans the road narrows to two lanes but remains limited access, with a raised median and yellow posts to reduce crossovers from one

direction of traffic to the other. This section is actually built on what was designed to be one direction of the two-direction highway. Due to public opposition, the second half of this segment has never been completed. Finally, from the Orleans Rotary until the road's end in Provincetown the road is once again a two- to four- lane road with curb cuts on both sides, although a grassed median does limit crossovers in Truro and Provincetown.

Adjacent land uses vary by location. In the limited access sections of the road there is some residential development and some industrial development along the corridor. In the sections with curb cuts there is more commercial development, as well as some retail activity.

Traffic flow along the corridor is reasonable in the winter but often stopped in the summer. At particularly bad times in the summer it is not unusual for traffic to be stopped for several miles east of the Sagamore Rotary.

Table 3.0 - Traffic Volumes: Route 6

<u>Town</u>	Summer <u>ADT</u>	Annual <u>ADT</u>	Summer P.M. <u>Peak Hour</u>
Bourne	25,900	19,000	1,682
Sandwich	67,900	49,900	8,908
Barnstable	60,000	44,100	5,901
Yarmouth	55,000	40,300	5,155
Dennis	41,000	30,100	3,296
Harwich	34,400	25,300	2,962
Brewster	27,500	20,300	1,760
Orleans	22,400	16,500	2,323
Eastham	26,800	19,700	2,364
Wellfleet	25,300	18,600	2,249
Truro	18,600	13,700	1,555
Provincetown	10,900	8,100	874

Transit service on this corridor primarily consists of Plymouth and Brockton bus service from Boston to Hyannis, which stops at the Sagamore Park and Ride and the Barnstable Park and Ride at Exit 6 before completing its run in downtown Hyannis. This service runs over ten times a day in each direction. Other transit service includes the Bonanza Bus service from Bourne to Hyannis a few times a day and the Plymouth and Brockton service from Boston to Orleans and Hyannis to Provincetown, which each run a few times each day. The buses to and from Orleans run on a commuter schedule, stopping at the Harwich, Barnstable and Sagamore Park and Rides as well as in Dennis before continuing on to Boston. The Hyannis to Provincetown service runs on Route Six from the Orleans Rotary to Provincetown. There are also limited summer shuttles on Route Six in Provincetown and Truro.

Bike travel along the corridor varies by location. Along the canal bicycles can parallel Route Six on the access road. From Sagamore to Barnstable bicycles can travel the frontage road but are banned from Route Six itself. From Barnstable to Dennis there is no real option for bicycles other than local roads. However, in Dennis the Cape Cod Rail Trail begins, following roughly the Route Six corridor all the way up to Wellfleet. From Wellfleet to Provincetown most bicycles use Route Six, which is also designated part of the Claire Saltonstall Bicycle Route. However, this route is somewhat hazardous for bicycles due to the high speed of most motorists along this route. Efforts to extend the Rail Trail to Provincetown have been underway for some time.

Three Park and Ride lots exist along Route Six, with parking for over 500 cars. The Sagamore Park and Ride is just off the Sagamore Rotary, with 377 spaces. The Barnstable Park and Ride is at Exit Six, with 225 spaces. The Harwich Park and Ride is at Exit 10, with 77 spaces. Of these, the Barnstable Park and Ride is the most crowded. An effort to expand that Park and Ride is underway by the Massachusetts Highway Department.

Alternative routes to 6 include Route 6A from Bourne to Yarmouth and again in Truro; Route 39 in Harwich, Brewster and Orleans; Sandwich Road on the south side of the Canal; and Route 28 in Dennis and Harwich.

3.2.0.1.2. - Problem Identification

The primary debate surrounding Route Six has been over safety. Some want to increase its capacity through structural improvements to accommodate high levels of traffic safely. As seen above in Figure 3.0, the levels of traffic between Dennis and Orleans are lower than those between Sandwich and Dennis, but still above what many consider the safe capacity of a two-lane highway with limited access and unpaved shoulders. A few accidents along this stretch (see Table 3.1) in the past led to the creation of the raised median and stanchions. However, many residents of the region remain opposed to making any more structural improvements to that section of the road, saying such improvements would lead to more development.

Table 3.1 - Average Annual Accidents (based on years '90, '91, '93): Route 6

<u>Town</u>	<u>Miles</u>	<u>All Accidents</u>	<u>Injuries</u>	<u>Fatalities</u>
Bourne	7.02	140	59	1
Sandwich	15.20	64	21	0
Barnstable	8.28	66	25	1
Yarmouth	4.56	43	19	0
Dennis	2.04	30	12	0
Harwich	5.63	14	4	0
Brewster	2.92	5	2	0
Orleans	3.60	13	4	0
Eastham	6.12	76	31	0
Wellfleet	8.56	36	19	0
Truro	9.93	25	11	1
Provincetown	3.80	16	9	0

Similarly, on the lower Cape many have sought some way to increase safety for pedestrians and cars along Route Six. In addition, the proliferation of curb cuts along that segment of the road have increased congestion and increased the potential for accidents. Also, in the segment along the Canal traffic tends to travel faster than the geometry of the road can safely allow.

Another problem in this corridor is an insufficient supply of Park and Ride spaces at the Barnstable lot. Commission surveys at that lot have found it to usually be close to or over capacity. The Harwich Park and Ride, which opened this year, may also have supply problems.

3.2.0.1.3. - Alternatives

Improvements to consider for the Route 6 corridor include:

- Adding parking spaces at the Park and Ride in Barnstable
- Providing more amenities at the Park and Rides
- Traffic calming along the "Scenic Highway" segment along the Canal
- Transit service to the National Seashore from the regional transportation centers
- Increased transit service along Route Six on the lower Cape
- Extension of the Cape Cod Rail Trail to Provincetown
- Creation of a "southside connector" to take traffic off the Scenic Highway by connecting the Bourne Bridge directly with the limited access segment of Route Six

3.2.0.2. - Route 28 Corridor

State Route 28 begins at the Eastham Rotary, runs counter-clockwise for almost

sixty-five miles through Atlantic Ocean/Nantucket Sound/Buzzards Bay villages from Orleans Center to Buzzards Bay before continuing north to the New Hampshire border.

3.2.0.2.1. - Existing Conditions

Traffic flow along the corridor is generally heavy during the summer, with gridlock occurring in many locations. However, the level of traffic varies greatly along the corridor:

Table 3.2 - Traffic Volumes: Route 28

<u>Town</u>	Summer <u>ADT</u>	Annual <u>ADT</u>	Summer P.M. <u>Peak Hour</u>
Bourne	33,600	24,700	2,500
Falmouth	17,200	12,600	1,070
Mashpee	22,100	16,200	920
Barnstable	25,500	18,700	1,570
Yarmouth	27,400	20,100	1,680
Dennis	14,800	10,900	1,000
Harwich	9,900	7,200	710
Chatham	15,650	11,500	1,200
Orleans	14,500	10,700	1,190

Transit service varies along this corridor. The SeaLine, year-round fixed route service, runs from Falmouth to Hyannis. Other year-round services in the corridor have included the Villager (which primarily operates on Route 132) in Hyannis and the Mashpee Circulator. The Cape Cod Scenic Railroad operates excursions from Hyannis. The Hyannis to Orleans Plymouth and Brockton bus travels Route 28 a few times a day, providing some transit access to those living in Yarmouth, Dennis, Harwich, Chatham, and Orleans

Bike travel along the corridor is common despite the fact that it can be quite dangerous. This is partially due to the busy curb cuts along the corridor and partially due to the lack of alternatives on most sections of this corridor.

Some alternative routes to 28 include Route 39, Great Western Road, Buck Island Road, Route 151 and, for longer trips, Route 6.

3.2.0.2.2. - Problem Identification

Much of the Route 28 corridor is congested during summer peak hours. Traffic also slows when there is an accident, construction, a tour bus or a bicyclist.

One major problem along the Route 28 corridor is how to provide for modes other than the automobile.

Route 28 is perceived to be a dangerous road. Accident data shows that the actual level of danger depends on the location in question. Segments in Barnstable and Yarmouth have the highest numbers of accidents.

Table 3.3 - Average Annual Accidents (based on years '90, '91, '93): Route 28

<u>Town</u>	<u>Miles</u>	<u>All Accidents</u>	<u>Injuries</u>	<u>Fatalities</u>
Bourne	8.7	105	32	1
Falmouth	14.6	192	81	1
Mashpee	3.7	58	26	0
Barnstable	10.4	229	98	2
Yarmouth	5.2	247	110	0
Dennis	3.4	76	34	1
Harwich	6.4	57	29	0
Chatham	7.3	58	24	0
Orleans	4.9	36	16	0

3.2.0.2.3. - Alternatives

Possibilities to improve the Route 28 corridor suggested in the past include:

- Continue year-round fixed route service on the section east from the Hyannis bus station and add bus stops & shelters
- Reducing need for bicycles to travel along Route 28, by improving bikeways along Buck Island Road in Yarmouth, Old Stage Road & Old Falmouth Road in Barnstable, Route 151 in Mashpee, and other alternatives.
- Further restricting commercial development along 28 to specified "village centers."
- From Falmouth to Centerville:
 - Access Management
 - Control land use
 - Increased public transit/shuttle service
 - Bicycle/pedestrian improvements
 - Road/intersection improvements

3.2.0.3. - Route 6A Corridor

Route 6A on Cape Cod is one of the oldest travel corridors in the country. Originally a path used by Native Americans, it was later adopted by colonists for travel from Plymouth out to Eastham. Later it served as state Route 6 until the construction of the current Route 6 in the 1950's. Today it is also known as the Old Kings Highway and is a state Scenic Road. Due to the historic nature of this roadway, it has not been significantly widened or altered in this century.

3.2.0.3.1. - Existing Conditions

Route 6A is narrow and windy, with little or no shoulder. For this reason passing is difficult and biking can be hazardous. Some segments have sidewalks (for example,

in Barnstable Village and Brewster) but often it is difficult to travel along this corridor any way other than by automobile.

Adjacent land uses vary by location. Several village centers exist along the corridor, such as Barnstable Village, Yarmouthport and Brewster. Several "new villages" have also sprung up as strip development in the last 20 years, such as the development in West Barnstable. In addition, Sandwich Center lies just off 6A to the south. Much of the corridor remains residential, however, or is undeveloped due to the proximity of wetlands.

Traffic flow along the corridor is generally heavy during the summer but rarely stopped. However, the level of traffic varies greatly along the corridor:

Table 3.4 - Traffic Volumes: Route 6A

<u>Town</u>	Summer <u>ADT</u>	Annual <u>ADT</u>	Summer P.M. <u>Peak Hour</u>
Bourne	17,200	12,600	970
Sandwich	10,400	7,700	660
Barnstable	9,100	6,700	650
Yarmouth	11,800	8,700	680
Dennis	8,800	6,500	640
Brewster	13,400	11,500	1,170
Orleans	15,700	11,500	1,100

Transit service is very limited on this corridor. A summer trolley runs in Sandwich Center and the Cape Cod Scenic Railroad goes along the corridor in Sandwich, but these services have almost no effect on traffic along the corridor. The Hyannis to Provincetown Plymouth and Brockton bus does travel the eastern portion of this corridor a few times a day, however, providing some transit access to those living in Yarmouth, Dennis, Brewster, and Orleans

Bike travel along the corridor is common despite the fact that it can be quite dangerous. This is partially due to the scenic nature of the corridor and partially due to the lack of alternatives on most sections of this corridor.

Alternative routes to 6A include Setucket Road in Dennis and Brewster, Old County Road in Sandwich, and, for longer trips, Route 6.

3.2.0.3.2. - Problem Identification

Much of the Route 6A corridor is congested during summer peak hours but not at the level of other Cape corridors such as Route 28 in Yarmouth or Route 6 on the lower Cape. In fact, a major problem along the Route 6A corridor is how to provide for modes other than the automobile. Several studies have been conducted on this subject, including a bicycle accommodation study and an alternate modes assessment conducted for the Commission in 1995.

Route 6A is perceived to be a dangerous road. Accident data shows that the actual level of danger depends on the location in question. Segments in Bourne and Orleans have the highest level of accidents (although less injuries and fatalities than in other spots). The segment of Route 6A that goes through Yarmouthport also has a relatively high number of accidents.

Table 3.5 - Average Annual Accidents (based on years '90, '91, '93): Route 6A

<u>Town</u>	<u>Miles</u>	<u>All Accidents</u>	<u>Injuries</u>	<u>Fatalities</u>
Bourne	0.6	21	8	0
Sandwich	7.5	71	31	0
Barnstable	8.4	22	11	1
Yarmouth	3.7	53	21	0
Dennis	4.3	39	16	0
Brewster	7.8	37	17	0
Orleans	1.7	59	25	0

3.2.0.3.3. - Alternatives

Possibilities to improve the Route 6A corridor suggested in the past include:

- Providing a trolley-type transit service in the summer with stops located off the roadway in village centers.
- Reducing need for bicycles to travel along Route 6A by improving bikeways along Setucket Road, Old County Road, and the frontage road along Route 6.
- Further restricting commercial development along 6A to specified "village centers"
- Construction of an exit ramp to Nickerson State Park in Brewster directly off of Route 6 to take that traffic off of Route 6A.

3.3. - Travel within Sub-Regions

Transportation on Cape Cod means different things to different people. Each town, village, business district, and even each neighborhood will have a slightly different (and in a handful of cases a drastically different) set of options and conditions that affect, and are affected by, travel. For a document of this scope it would be impossible, and imprudent, to provide such detail. Some comparisons and evaluation can be made at a larger scale. Therefore, transportation at the "local" scale is discussed for Sub-Regions (see Figure x) as identified in the following sections:

3.3.1. - The Outer Cape

The Outer Cape towns include Provincetown, Truro, Wellfleet, and Eastham. They

consist of 16% of the land area of Cape Cod, and contain 12,089 residents (6 % of the Cape). They also contain 6% of the jobs in the county.

Many workers commute into or out of this region, but even more workers commute within this region. A full 81% of the 4,593 jobs within the four town area are held by residents of these towns.

3.3.1.1. - Transportation Facilities

Transportation infrastructure includes over 430 miles of roadway, limited intercity and local bus services, commercial airline service and passenger ferry service. Various bicycle paths exist through the area, pedestrian facilities are primarily located in village centers.

One major north-south corridor links the Outer Cape towns - both to each other and the other sub-regions of Cape Cod. Small-scale commercial air services are available at the Provincetown Airport. Passenger ferries between Provincetown and Plymouth and Boston operate a limited number of runs during the summer.

3.3.1.1.1. - Roadway Network

On the Route 6 roadway corridor scheduled Plymouth & Brockton Street Railway Co. bus service operates from Provincetown to Hyannis. The service, one trip outbound and one trip inbound, includes stops in Provincetown, North Truro, Truro, Wellfleet, South Wellfleet, North Eastham, and Eastham. A paratransit service called the "b-bus" is available in these towns and is provided by the Cape Cod Regional Transit Authority (CCRTA).

Commercial areas have developed on many sections of Route 6 in Eastham. For more information please see the appendix.

3.3.1.1.2. - Bike Facilities

The Cape Cod Rail Trail connects the area from other parts of the Cape. From Rock Harbor Road the trail follows former railroad right-of-way through Eastham to Lecount Hollow Road in Wellfleet. The State Bicycle Route 1 or Claire Saltonstall bikeway (which uses the trail) continues along side roads and bike path segments until North Truro and Provincetown where it follows Route 6A.

3.3.1.1.3. - Air Service

This region contains Provincetown Airport. Air service from and to Boston runs a few times each day.

3.3.1.1.4. - Ferry Service

Passenger ferry service operates from Provincetown to Boston and Plymouth during the summer.

3.3.1.2. - Transportation Issues and Problems

Some Outer Cape roadways are operating near design capacities, due to the rise in tourism and year-round populations in the region and an increased reliance on single-occupant vehicles. However, geographic, cost, character issues and policy restraints preclude for the most part building additional highway systems or adding capacity to the existing roadways. In any case, in other parts of the country where widening has been possible, the new vehicular capacity was used quickly and consequently mobility was not enhanced for the long term. In general, the public consensus indicates a strong desire to find alternatives to widening roadways.

Some alternatives have been identified. Creation of a convenient trolley shuttle system and facilities to encourage use of bicycles for commuting a portion of trips will help by providing alternatives to driving alone.

3.3.2. - The Monomoy Area

The towns of Dennis, Harwich, Brewster, Chatham and Orleans lie east of the heavily developed Barnstable/Yarmouth area and south of the Lower Cape. These towns make up the "elbow" of Cape Cod, and the Monomoy region studied in the Monomoy Capacity Study. This sub-region is 19.2% of the land area of the Cape. In 1990, these towns contained 45,000 residents (24% of the Cape) and 16,500 jobs (21% of the county total).

Of the 16,500 jobs in this sub-region, 75% were held by residents of the sub-region. A small but growing number of residents of this region work in the Boston region; 165 according to the 1990 census.

3.3.2.1. - Transportation Facilities

This region has an extensive network of roads; 56 miles of state highways and over 400 miles of local roads. However, it has a limited transit system. It does, however, contain several bikeways and roads appropriate for biking. Mobility across this region is important because it provides the only land connection to the Outer Cape. It also contains several regional destinations such as Nickerson State Park, part of the Cape Cod National Seashore, and the commercial center of Orleans.

3.3.2.1.1. - Roadway Network

The Monomoy sub-region roadways are not easily explained. Routes 6, 6A and 28 all traverse the region from the Yarmouth boundary to the Orleans rotary, where they all meet. In addition, Routes 134, 124 and 137 cross the sub-region from north to south, Route 39 also cuts across Harwich and Chatham, providing a shorter route than Route 28 across the southern part of the sub-region. In 1996 a Park and Ride lot with room for 77 cars opened just off Route 6 in Harwich.

Transit service is provided both by town shuttles and by Plymouth and Brockton. Dennis, Orleans and Harwich all ran shuttles in 1996, although Harwich has since discontinued their service. P&B has several runs a day along Routes 6 and 6A to Provincetown from Hyannis and also offers express service to and from Orleans and the Harwich Park and Ride to Boston.

It is interesting to note that the directional signs on some state routes in this sub-region are confusing due to the geography of the sub-region. For example, Route 28 is signed as Route 28 South as it heads from Dennis to Orleans despite the fact that it travels first east, then north before ending in the Orleans Rotary.

3.3.2.1.2. - Rail Service

Tracks coming from the west terminate in Dennis, where a lumber yard receives occasional shipments by train. Other than this service, there is no longer any rail service in this sub-region. The tracks that formerly crossed the region have now been replaced by the Cape Cod Rail Trail.

3.3.2.1.3. - Bike Facilities

The main bike facility in this sub-region is the Cape Cod Rail Trail, built on the old rail right-of-way from Dennis to Wellfleet. This route provides a major east-west corridor for (mostly recreational) bike traffic across the elbow of Cape Cod. A bike trail through Harwich and Chatham is also in the design phase. In addition, recreational bike facilities exist in Nickerson State Park.

3.3.2.1.4. - Air Service

There is only one airport in this region, Chatham Airfield, and no commercial traffic.

3.3.2.1.5. - Ferry Service

Passenger ferry service operates from Harwich to Nantucket during the summer.

3.3.2.1.6. - North/South Transportation Link: Rt 134

Route 134 in Dennis provides a link from Route 6A in the north and Route 28 in the south to Route 6. Local road connections at either end serve neighborhoods and beaches. This roadway is two lanes except for a four-lane section between Route 6 and Upper County Road. This section, near the Patriot Square shopping center also includes a center lane for turning. Traffic signals are located at the Route 6A, Old Chatham Road, Access Road, Patriot Square, Upper County Road, and at Route 28. Adjacent to Route 134 is the parking lot for the western end of the Cape Cod Rail Trail.

3.3.2.2. - Transportation Issues and Problems

This area is generally not congested, although certain road segments such as Main Street in Chatham west of downtown operate well over capacity during peak hours. However, as noted in the Monomoy Capacity Study, the roads of this region are predicted to become considerably more congested in the next ten years if current land use patterns and growth rates continue. If the current trend of converting seasonal housing to year-round use continues congestion could become even worse.

The Monomoy region is also where Route Six becomes a limited access highway with one lane in each direction. This is an unusual configuration, particularly because the entire highway is built along half of the right-of-way (which was acquired as part of the original plan to build a two lane highway all the way to the Orleans rotary). Some would like to see the highway widened to a four lane configuration, or improved with a paved shoulder. Others feel that widening the highway would simply allow more development to occur on the lower Cape, and note that current traffic levels are adequately served by one lane in each direction.

3.3.3. - The Barnstable/Yarmouth Area

The towns of Barnstable and Yarmouth make up the "urban core" of the Cape. They consist of 21% of the land area of Cape Cod, and contain 62,000 residents or 33% of the Cape's population. They also contain 40% of the jobs in the county. Although a portion of workers commute into or out of this sub-region, 76% of employed persons living within the towns of Barnstable and Yarmouth work in these two towns. Along with the town of Dennis, Barnstable & Yarmouth are often referred to as the "Mid Cape." The effect of geography (transportation between Dennis & Yarmouth is restricted by water bodies such as Bass River) has made it more practical to address Dennis issues in the previous section which discusses the Monomoy Area.

3.3.3.1. - Transportation Facilities

Transportation infrastructure includes 796 miles of roadway, intercity and local bus services, limited rail service, commercial airline service and ferry service. An Intermodal Transportation Center to coordinate these different transportation services is under design for location in Hyannis near the existing bus and railroad stations. Mobility to and within this "urban core" is beneficial for access to regional and local services, such as the transportation connections, the Cape Cod Hospital, the Cape Cod Mall and downtown Hyannis. Other facilities in the Barnstable/Yarmouth area include Cape Cod Community College located on Route 132 with the YMCA and the Cape Cod Conservatory nearby.

Three major west-east corridors link the towns of Barnstable and Yarmouth--both to each other and the other sub-regions of Cape Cod. Also, the railroad right of way comes from the west into the Town of Barnstable and forks with one section of tracks heading through Yarmouth into Dennis to Route 134 and the other turning near Willow Street toward termination in Hyannis. This sub-region also has links

by air and water in the Hyannis area of Barnstable. Commercial air services are available at the Barnstable Municipal Airport and ferries operate from Hyannis Harbor to the islands.

3.3.3.1.1. - Roadway Network

The three roadway corridors are Route 6, Route 28 and Route 6A. Scheduled Plymouth & Brockton Street Railway Co. bus service operates from Boston into Hyannis on Route 6 stopping at the Park and Ride commuter lot in Barnstable and continuing down Route 132 and Barnstable Road to the bus terminal in downtown Hyannis. Plymouth & Brockton Street Railway Co. continues to provide regional service from Hyannis to Provincetown as well. In addition, a regional year round fixed route bus service from Falmouth travels to the bus station in Hyannis. Summer shuttles from the south side of Yarmouth and Dennis connected with a summer shuttle and other regional and intercity services in Hyannis. A paratransit service called the "b-bus" available in these towns is provided by the Cape Cod Regional Transit Authority (CCRTA).

The limited access, four lane, median divided, Mid Cape highway or Route 6 has four access points through this section of Cape Cod. Major regional roadways emanate in both northerly and southerly directions from the Route 6 exits. Commercial areas have developed on two of these north/south connectors increasing travel demand and leading to sections of widened four lane roadway on Route 132 and Union Street/Station Avenue.

3.3.3.1.2. - Bike Facilities

There is no off-road regional bikeway in the area. The State Bicycle Route 1 or Claire Saltonstall bikeway follows the Service/Access Road in Barnstable from the Sandwich town line across Route 149 to Route 132, Route 132 to Phinneys Lane,

Phinneys Lane/Hyannis Road to Route 6A, Route 6A from the signal at Hyannis Road easterly to Setucket Road in Yarmouth. This route continues along Setucket Road to Mayfair Road in Yarmouth and into Dennis. Although this is a designated bike route, little geometric evidence of this exists. Many bicyclists are making trips in the sub-region though few roadways comfortably accommodate bicycle use.

3.3.3.1.3. - Air Service

This region contains the major commercial airport on Cape Cod, Barnstable Municipal Airport, as well as the Cape Cod Airport. Air service is available several times each day on several different carriers between the Barnstable Municipal Airport and other destinations including the Islands and Boston. At the junction of Route 149 and Race Lane, the Cape Cod Airport operates glider plane rides.

3.3.3.1.4. - Rail Service

Amtrak arrives from Providence, Rhode Island in Hyannis approximately twelve times per year on Friday nights in the summer, and returns on Sunday afternoons. The Cape Cod Railroad operates excursion train service between Hyannis and Sandwich--four round trips on Tuesdays through Sundays from June through October.

3.3.3.1.5. - Ferry Service

Automobile and passenger ferry service operates from Hyannis to Nantucket year-round. Passenger only operates between Hyannis and Martha's Vineyard.

3.3.3.1.6. - North/South Transportation Links

There are four areas within the Barnstable-Yarmouth area that provide north/south transportation connections:

- In West Barnstable Route 149 (a two lane roadway), connects Route 6A and 28. This route heading towards the south also leads to Osterville-West Barnstable Road which intersects Route 28. A year round bus service connecting the villages of Cotuit with Marstons Mills, West Barnstable via Route 149 was tried from November 1995 through June 1996 and had little ridership. The area is primarily low density housing and north of Route 6 is considered rural. The West Barnstable Railroad Station building was sold recently to a private concern but remains vacant and boarded up.
- Route 132 in Barnstable provides a link from Route 6A or Route 6 to the Barnstable Municipal Airport for access to Barnstable Road into Hyannis, leading to downtown, the Plymouth & Brockton Street Railway Co. Bus Station and the ferry terminals at the harbor. This roadway is two lanes from Route 6A to just before the signalized intersection of Route 132 with Phinneys Lane where it widens to an undivided four lanes. The four lane cross section continues through three more signalized intersections to the signalized intersection of the Capetown Plaza and the Cape Cod Mall entrances where a small median barrier exists. Route 132 narrows as it approaches and connects with Route 28 at the Airport Rotary.
- Willow Street in Yarmouth at Exit 7 connects with Route 6A to the north and Yarmouth Road at the Barnstable town line which leads to Route 28 and into Hyannis for an alternative approach to downtown. This access to Main Street, Hyannis passes the new Steamship Authority parking lot at the corner of Yarmouth Road and Main Street; this lot is just east of the railroad tracks and the future intermodal transportation center site. In addition, this exit and roadway system to the fork of Yarmouth Road and Camp Street, south of Route 28, is the primary access route to the Cape Cod Hospital. From Willow Street near the Route 6 exit ramps, Higgins Crowell Road provides a

connection to Route 28 in West Yarmouth. Higgins Crowell Road also intersects with Buck Island Road—an alternative to Route 28 for east-west traffic in the area. Further south from Route 6 down Willow Street is Camp Street which also connects both to Buck Island Road and Route 28. Though travel demand is high in this area, few alternative provisions are present. P&B provides a connection originating in Provincetown from Route 6A into Hyannis via Willow Street. Summer trolley service primarily on Route 28 was provided through demonstration project ISTEA funding to improve air quality; this funding may not exist in the future. The Town of Yarmouth is working on improvements for Buck Island Road which include bicycle accommodation. Route 28 has bicycle traffic, especially in the summer season when seasonal workers commute via bicycle, yet the roadway has many access points and no markings for bicyclists.

- Union Street in Yarmouth is a main connector between Route 6A and Route 28 for destinations in Yarmouth and Dennis. This corridor with a section which is an undivided four lane roadway has few alternatives to the automobile.

3.3.3.2. - Transportation Issues and Problems

Geographic, cost, character issues and policy restraints preclude for the most part building additional highway systems or adding capacity to the existing roadways. In general, consensus from the public to date in the Barnstable/Yarmouth area indicates a strong desire to find alternatives to widening roadways. With ISTEA for direction toward intermodalism, a more balanced and coordinated system will improve the functioning of the Barnstable/Yarmouth area infrastructure in a more cost-effective and environmental manner thereby improving the quality of life. Town level policy and land use decisions affect the operation of the transportation assets. Growth centers must be chosen which provide for efficient transit

connections to encourage this alternative. With redevelopment or new development along major routes, the site plan review committee should require a transit oriented connection to the major roadway and require parking to the back or side of the development. Some alternatives have been identified. The Intermodal Center in Hyannis has the potential to create a more efficient, connected system for transfers between modes which will aid in allowing for more trips without an automobile. In addition, increased trips by pedestrians and bicyclists will be encouraged with improvements for safety of these trip types. Accommodation of bicycles with the addition of lanes for this mode should be considered for major routes such as Routes 28 and 132. A bicycle connection to the intermodal center site as a spur from the westerly extension of the Cape Cod Rail Trail into Yarmouth and Barnstable will provide benefits for the region.

3.3.4. - The Upper Cape

The Upper Cape towns of Bourne, Sandwich, Falmouth and Mashpee include the landward gateway to the Cape. They consist of 37% of the land area of Cape Cod, and contain 67,000 residents or 36% of the Cape's population. They also contain 33% of the jobs in the county. Although a portion of workers commute into or out of this sub-region, 63% of employed persons living within the four town area of Bourne, Sandwich, Falmouth and Mashpee work in these towns. The Upper Cape area includes regional and local services, such as the transportation connections, shopping centers and the Falmouth Hospital.

3.3.4.1. - Transportation Facilities

Transportation infrastructure includes 1,195 miles of roadway, intercity and local bus services, limited rail service and ferry service.

3.3.4.1.1. - Roadway Network

The Cape Cod Canal bisects the Town of Bourne and is bridged in just three places--two for vehicular traffic. The three major west-east corridors connecting this sub-region to other parts of Cape Cod are Route 6A, Route 6 and Route 28. However, both Route 6A and Route 6 function more for intra-regional travel from Falmouth and Mashpee as no direct connections are made to these towns by these corridors. Additional regional corridors serve as a network for the sub-region. Route 151 from Route 28 in Falmouth near the Bourne town line crosses through North Falmouth and connects to Route 28 in Mashpee. Route 130 from Route 6A to Route 6 in Sandwich and on to Route 28 in Barnstable just east of Mashpee/Barnstable town line annexes Mashpee with Sandwich and allows access to Route 6.

Bonanza Bus Lines provides intercity service from this sub-region to Boston and Providence, Rhode Island. The SeaLine, a regional year round fixed route bus service, travels from Falmouth through Mashpee primarily on Route 28 to the Plymouth & Brockton Street Railway Company (P&B) bus station in Hyannis. The Park and Ride commuter lot in Sagamore is serviced by P&B for trips to and from Boston. The Cape Cod Regional Transit Authority (CCRTA) has operated the "WHOOSH", a summer shuttle, between downtown Falmouth and Woods Hole since 1993 with ridership increasing each year. Falmouth Hospital enacted a courtesy bus to aid in providing an alternative for the area. In addition to the hospital courtesy bus, the "b-bus", a paratransit service, is available in these towns and is provided by the CCRTA.

3.3.4.1.2. - Ferry Service

This sub-region also has links by water in Falmouth to the Islands. The Steamship Authority ferries operate from Woods Hole to the islands carrying passengers, bicycles, automobiles and trucks. Another ferry operator, the Island Queen provides

passenger service from Falmouth Harbor to the Islands. In July 1995, the Steamship Authority carried bicycles, passengers and automobiles as follows:

<u>SSA Route</u>	<u>Bicycles</u>	<u>Passengers</u>	<u>Automobiles</u>
Woods Hole-Martha's Vineyard	8,227	173,445	23,141

The number of bicycles does not include those carried on or in automobiles. During 1994, the Steamship Authority [SSA] transported the following:

- 355,389 automobiles between Woods Hole in Falmouth and the Islands
- 61,156 trucks between Woods Hole in Falmouth and the Islands
- 416,545 vehicles carried by SSA between Woods Hole and the Islands
- 2,018,533 passengers by SSA between Woods Hole in Falmouth and the Islands

3.3.4.1.3. - Bike Facilities

The Boston to Cape Bikeway, also known as State Bicycle Route 1 and the Claire Saltonstall bikeway reaches the Cape Cod region on Route 3A in Bourne and follows Route 3A to Meetinghouse Road which connects to the Sagamore Rotary and Bridge. Once over the Sagamore Bridge, this bicycle route connects with Route 6A to the intersection of Route 6A and Route 130 in Sandwich. State Bicycle Route 1 proceeds south on Route 130 to the junction with the Service Road in Sandwich. The bike route continues on the Service Road in Sandwich and into the Town of Barnstable. Other bicycle trails include the bike paths along both sides of the Canal in Bourne and the Shining Sea Bike Path in Falmouth to Woods Hole.

3.3.4.1.4. - Rail Service

The third bridge across the Cape Cod Canal is the railroad bridge. Amtrak traverses through this sub-region from Providence, Rhode Island to Hyannis approximately twelve times per year on Friday nights in the summer and returns on Sunday afternoons. Cape Cod freight shipments by rail are made three to four times per day

year round; this is primarily to transport trash to the SEMASS plant in Rochester. The Cape Cod Railroad operates excursion train service between Hyannis and Sandwich - four round trips on Tuesdays through Sundays from June through October.

3.3.4.2. - Transportation Issues and Problems

- under-utilized third (rail) bridge over the Cape Cod Canal
- lack of bicycle connections across the Cape Cod Canal
- most of freight shipment is by trucks
- recent land development which is auto-oriented
- lack of local transit service

4. - Realizing the Vision: Goals, Policies and Strategies

Making it happen? First we need to figure out what it is and to answer three simple questions -

WHY are we doing something?

- WHAT helps make it happen?

HOW do we do it?

As we implement transportation solutions in the future, we easily be able to answer "why?" - to further the goals of the plan. The question "what?" is dealt with by the policies. A policy is what brings us closer to meeting the goal. "How" we do it is through implementation of the strategies identified which support the policy.

The five goals listed in the following section are interdependent - solutions must be sought which do not create conflicts among them. The following statement shall apply to all five goals and their policies:

Policy Preamble

Transportation Solutions shall mean any project, program, strategy, or activity which support policies which help to meet the goals of the Regional Transportation Plan.

It is the policy of the Regional Transportation Plan that transportation solutions be consistent with Barnstable County Ordinance 96-8, otherwise known as the Cape Cod Commission regional Policy Plan

4.1. -The "Right" Transportation System

"To establish and maintain a transportation system on Cape Cod for present and future year-round and seasonal needs which is safe, convenient, accessible, economical and consistent with the Cape's historic, scenic and natural resources."

To achieve this goal we must implement solutions which are consistent with the character of Cape Cod. These solutions will typically be non-invasive; that is, by better management of "people-flow" and more efficient use of automobile capacity, the traditional attempt to build our way out of congestion can be avoided.

4.1.1. - Policies

- Transportation solutions which are safe, economical and non-structural shall be given preference
- Select transportation solutions which have the broadest benefit to moving people and goods, not just single - occupant automobiles
- Maintenance activities should be performed which minimize life-cycle cost

4.1.2. - Strategies

- Develop a cross-section consistent with roadway function and historic & environmental constraints to accommodate autos, bikes & pedestrians safely on narrow rights-of-way and seek adoption by MHD, FHWA. Educate users to respect other users. (Engineering Directive E-95-007/MATForce/Design Manual)
- Provide bicycle lanes along Rt 28 from Osterville to Dennis and on Route 132
- Provide improvements for pedestrian safety in village areas of Route 28.
- Increase capacity of the Barnstable Park & Ride lot
- Improve amenities at the Sagamore and Barnstable Park and Ride lots, including increased security

- Identify and implement improvements to Route 6 intersections
- Identify improvements for Bourne & Sagamore rotaries
- Install permanent traffic counting stations at strategic locations
- Provide local marketing of Caravan
- Identify suitable intersection and replace multi-phase signal with modern roundabout
- Provide bike storage at park & ride lots
- Improve & increase rail service to Cape Communities
- Landscaping and proper aesthetic treatments should be included in transportation projects

4.2. - Modes and Roads

"To reduce dependence on private automobiles by developing and integrating alternate modes (e.g., rail, bus, ferry, air, bicycle and pedestrian) into the transportation system and by promoting substitutes for transportation such as telecommunications."

Achieving this goal will require a comprehensive package of substitutes to automobiles. New public transit service, bicycle and pedestrian facilities, and other important alternatives are necessary.

4.2.1. - Policies

- Integrate, expand, and increase alternate modes of transportation in order to provide choices for users
- Provide safe convenient connections for and between all modes
- Improve user access to the multi-modal transportation system

4.2.2. - Strategies

- Create a bicycle and transit map of the Cape annually that can be distributed as part of a tourism package or via the World Wide Web to potential visitors
- Complete a connection from the Dennis end of Cape Cod Rail Trail to the new Intermodal Center.
- A water shuttle from Barnstable Harbor to harbors on the lower Cape
- Improve air service to Cape airports from off-Cape
- Daily train service to Falmouth from Boston
- Weekend Amtrak service from New York to Hyannis
- Automobile ferries from Plymouth to Provincetown should run several times a day to reduce traffic on the lower Cape
- Bicycle lanes should be built on Route 28 and Route 132 in Hyannis and Yarmouth
- Provide transit service from the Intermodal Center to the National Seashore
- No fees should be charged to transporting bicycles on transit
- Provide shuttle service along Route 6A from Barnstable to Orleans
- Improve & increase rail service to Cape Communities

4.3. - Land Use Causes Transportation Causes Land Use

"To support transportation solutions which preserve and enhance Cape Cod's character by considering the interrelationship between changes in transportation capacity and changes in land use."

This goal recognizes the cycle of land-use influencing transportation investment which spurs a change in land use. This endless game of leap-frog too often results

in undesirable levels of development or an unsatisfactory transportation system or both. Transportation improvements, whether they be the construction of new automobile capacity, increased public transit, more efficient use of the existing system, etc., will have implications for land use. Recommendations are geared towards protecting transportation investment by controlling the potential impacts of new development.

4.3.1. - Policies

- As development and redevelopment occurs, provisions should be made for safe and convenient pedestrian, bicycle, and transit connections.
- Transportation solutions which support efficient land-use patterns shall be given preference
- Support efforts to distribute services into efficiently located, environmentally sensitive activity centers in order reduce trip length
- Make decisions based on balanced transportation solutions which explicitly address impacts on land use and the environment

4.3.2. - Strategies

- Promote impact fees for all new development - scale fees for undesirable development higher and lower for desirable.
- Only allow impact fees/mitigation for transit where transit exists - and is operating cost-effectively.
- In order to reduce growth-related pressures on our transportation system, preserve land through acquisition
- Develop a regional transportation model that analyzes the interaction of land use and transportation demand/capacity

4.4. - Traveling Smarter

"To promote an information-based consumer-oriented transportation system that encourages travelers to use the most environmentally sensitive and efficient means of travel."

New information technologies are being explored to help people make the best transportation choices. Travel decisions are influenced by the transportation system as well as the traveler's purpose. When alternatives to the automobile are not available (or acceptable), drivers may decide to travel at less congested times, plan their routes to make several stops as part of the same trip, or on some occasions, to cancel their trips altogether.

Providing travel information is a benefit, even if it doesn't result in easily measurable reductions in congestion or increases in safety. Excessive signage adversely affects the scenic, historical and environmental characteristics of Cape Cod.

4.4.1. - Policies

- Implement transportation solutions which encourage off-peak travel and discourage on-peak travel, or which encourage travel via alternatives to single-occupant automobiles, or eliminate the need for travel

- Provide users easy access to real-time traffic and transit information at minimal cost
- Business Logo signs shall not be permitted within the rights-of-way of state highways on Cape Cod. Generic service panels, identifying services adjacent to freeways, shall be used, where appropriate and providing that they create no adverse visual impacts.

4.4.2. - Strategies

- Implement ITS including variable message signs and highway advisory radio
- Evaluate congestion pricing
- provide toll-free smart-traveler number
- integrate real-time traffic conditions into CCC web-page
- Traffic Management Center
- Produce an annual bicycling and transit map for distribution with tourism packages or over the World Wide Web to potential visitors.

4.5. - Working Together

"To promote cooperation among the various transportation agencies which have responsibility for the Cape's transportation system."

For the Regional Transportation Plan to be effective, new partnerships that bring together the various levels of government will be formed to make sure that transportation "solutions" do not become problems.

Another step in the process that has room for improvement is educating, informing, and hearing the "customers." Bringing transportation plans to the

public early on avoids surprises - and can provide planners with insights on how to make these plans better. Exploring new ways to inform and hear our customers - through e-mail and the world wide web - is one way to grow the forum of discussion.

4.5.1. - Policies

- Work with airport operators and air carriers to maintain and improve air service to the Cape and Islands
- Develop transportation solutions which support the plan's goals in cooperation with Massachusetts Highway Department and local agencies including the public
- Develop programs involving the public and private sector's participation that implements an integrated multi-modal transportation system

4.5.2. - Strategies

- Every effort should be made to inform affected agencies about our goals and intentions without delay

4.6. - Analysis of Transportation Solutions

The goals and policies (listed in the previous section) of the RTP are Barnstable County's framework for developing and evaluating transportation solutions consistent with ISTEA. This section is intended to clearly define the correspondence between ISTEA factors listed in the first chapter and the RTP. For ease of reference, the text of the goals is repeated below in Table 4.0. Table 4.1 follows, showing the relationships.

Table 4.0 - Cape Cod Regional Transportation Plan Goals

No.	Name	Text
1	The "Right" Transportation System	To establish and maintain a transportation system on Cape Cod for present and future year-round and seasonal needs which is safe, convenient, accessible, economical and consistent with the Cape's historic, scenic and natural resources.
2	Modes and Roads	To reduce dependence on private automobiles by developing and integrating alternate modes (e.g., rail, bus, ferry, air, bicycle and pedestrian) into the transportation system and by promoting substitutes for transportation such as telecommunications.
3	Land Use Causes Transportation Causes Land Use	To support transportation solutions which preserve and enhance Cape Cod's character by considering the interrelationship between changes in transportation capacity and changes in land use.
4	Traveling Smarter	To promote an information-based consumer-oriented transportation system that encourages travelers to use the most environmentally sensitive and efficient means of travel.
5	Working Together	To promote cooperation among the various transportation agencies which have responsibility for the Cape's transportation system.

Table 4.1 - Correspondence between RTP and ISTEA

ISTEA Factors	Cape Cod Regional Transportation Plan Goals				
	1	2	3	4	5
1. Preservation of existing transportation facilities and, where practical, ways to meet transportation needs by using existing transportation needs by using existing transportation facilities more efficiently.	●			●	●
2. Consistency of transportation planning with applicable Federal, State, and local energy conservation programs, goals and objectives.				●	●
3. The need to relieve congestion and prevent congestion from occurring where it does not occur.	●		●		●
4. The likely effect of transportation policy decisions on land use and development and the consistency of the transportation plans and programs with the provisions of all applicable short and long-term land use and development plans.			●		●
5. The programming of expenditures on transportation enhancement activities as required in section 133.	●	●			●

6. The effects of all transportation projects to be undertaken within the metropolitan area, without regard to the source of funding.			●		●
7. International border crossings and access to ports, airports, intermodal transportation facilities, major freight distribution routes, national parks, recreation areas, monuments and historic sites, and military installations.		●			●
8. Connectivity of roads within metropolitan areas with roads outside of these areas.	●				●
9. Transportation needs identified through the use of the management systems required by section 303 of this title.	●	●		●	●
10. Preservation of rights-of-way for construction of future transportation projects.	●				●
11. Methods to enhance the efficient movement of freight.	●				●
12. The use of life-cycle costs in the design and engineering of bridges, tunnels, or pavement.	●				●
13. The overall social, economic, energy, and environmental effects of transportation decisions.			●		●
14. Methods to expand and enhance transit services and to increase the use of such services.		●			●
15. Capital investments that would result in increased security in transit systems.		●			●
16. Recreational travel and tourism.	●				●

ISTEA Factors

1 2 3 4 5
Cape Cod Regional Transportation Plan Goals

Table 4.2 contains an index of projects considered in the Regional Transportation Plan. Please note the project number of a particular project since the following pages are organized by these. Following the index are summaries and analyses of projects considered in the plan. Information for each project is presented in two sections. The first section includes a description of the project as well as estimates of the costs associated with it. Note that the costs are estimated in current dollars. The "RTP Projected Cost" equals the "Annual Cost" multiplied by the analysis period, 23

years, added to any "Upfront Costs." This places capital projects on equal footing with projects incurring operating costs.

The "Goal Compatibility Analysis" is used as a screening of the project. Should the project detract from an RTP Goal, a finding of "Incompatible" will be noted. If one or more "Incompatible" statements occur, the project is considered incompatible and no further analysis is warranted.

In the second section, several criteria are used in the analysis of projects. Criteria include:

- **Travel Miles:** the benefits quantified for this criterion are based on the output of the regional transportation model when available. 1 Benefit = 9 modeled VMT reduced. If a project is expected to have automobile travel mileage reduction but does not lend itself to modeling, best estimates of the benefits will be used.
- **Travel Hours:** the benefits quantified for this criterion are based on the output of the regional transportation model when available. 1 Benefit = 1 modeled VHT reduced. If a project is expected to have regional travel time reduction but does not lend itself to modeling, best estimates of the benefits will be used. Note that the value of distance and time corresponds to the "90/10" relationship often used in estimating route choices.
- **Safety:** solutions which have clear and lasting reductions in the likelihood and severity of accidents will assigned benefits according to the best methodology available.
- **Air Quality:** benefits are related to reductions in the precursors of ozone as determined from output of the regional transportation model air quality

programs (when available). 1 Benefit = reduction of 100 g of VOC or 100 g of Nox.

- Systems Mgmt: projects which are integral to others may be assigned benefits based on their importance to the transportation system. For example, a project that "fills in the gap" between two facilities or serves multiple modes would receive benefits.
- Infrastructure: early expenditures for maintenance/preservation in order to avoid much greater costs in the future would be assigned benefits.
- Environment: projects which improve or provide new protection for the natural and man-made environment, including scenic and historic resources and community character, would be assigned benefits.
- Mode Shift: projects which are likely to have a long-term effect on travelers' selecting a mode other than the single-occupancy automobile would be assigned benefits.
- Access Management: by reducing conflicts, combining curb cuts, providing internal connections between parcels, benefits would be assigned.

A transportation project may have benefits under several criteria. The magnitude of these benefits is comparable between projects. This means that a large project when compared to a smaller one (e.g., a multi-town transit service vs. a smaller service in a single village) would have greater quantified benefits (e.g., more reduced automobile mileage). All the criteria benefits are totalled together into a "Benefit Level."

The Benefit Level is then divided into the RTP Projected Cost (in millions of dollars) to come up with a "Score." This analysis allows smaller projects to score higher than larger projects despite a potential difference in the quantity of benefits.

<u>RTP#</u>	<u>Title</u>	<u>RTP#</u>	<u>Title</u>
900	Resurfacing BUNDLED	1010	Bourne Rotary Reconfiguration
901	Bridge BUNDLED	1011	Attucks Way Extension
902	Transit BUNDLED	1012	Rt 132 Boulevard
903	Intersection BUNDLED	1014	Cape Cod Rail Trail Resurface & Widen
904	Bicycle/Pedestrian Projects BUNDLED	1015	Cape Cod Rail Trail Extensions
905	Access Management BUNDLED	1016	Rt 28 Bike Accommodation - Hyannis-Dennis
906	Transportation Enhancements BUNDLED	1021	Rt 6A Shuttle Service
907	TDM/TSM BUNDLED	1022	Transportation Management Center
908	New Ferry Service - BUNDLED	1023	Variable Message Signs
909	Regional Bike Network BUNDLED	1024	Permanent Traffic Counting Stations
1000	Cape Cod Rail Trail Bridges	1025	Expand/enhance Exit 6 Park & Ride
1001	Hyannis Intermodal Center - ph. 1	1027	Safety Improvements Rt 6
1002	Hyannis Intermodal Center - ph. 2+	1029	Telecommuting Center
1003	Exit 6 1/2 - Hyannis Access	1030	Land Conservation
1004	Southside Connector	1031	Cape-wide Highway Advisory Radio
1005	Nickerson Park Access from Route 6	1035	Cape Cod Capacity Study
1006	Rt 28 MacArthur Boulevard Improvements*	1036	Harwich/Chatham Rail Trail Extension
1008	Rt 6 Reconfigure Interchange One	1037	Rt 6 Eastham - Safety Improvements
1009	Sagamore Rotary Reconfiguration		

Projects Analysis

1

RTP# 900 Resurfacing BUNDLED

Description BUNDLED PROJECTS
Roadway Resurfacing & Rehabilitation

Annual Cost \$15,200,000 RTP Projected Cost
Upfront Cost \$349,600,000

Score

Project I.D.

SECTION 1 - DESCRIPTIVE

Goal Compatibility Analysis

goal 1 Compatible
goal 2 Compatible
goal 3 Compatible
goal 4 Compatible
goal 5 Compatible

Compatibility
Compatible

Benefits Analysis

Travel Miles
Travel Hours
Safety 115.0
Air Quality
Systems Mgmt
Infrastructure 230.0
Environment
Mode Shift
Access Mgmt

VT Reduction

VHT Reduction

Emissions Reduction VOC

Emissions Reduction NOx

Comments/Recommendations

Generally Compatible - Benefits of individual projects will vary. Cost analysis based on 1997 TIP, 23 Projects

Methodology to be enhanced with results of PMS

Benefit Level 345.0

SECTION 2 - QUANTITATIVE

Source of Origin

PMS

KEY: SBP = State Bike Plan

SPP = State Pedestrian Plan

JTC = Cape Cod Joint Transportation Committee

28 = Route 28 Corridor Study

CMS = Congestion Management System

BYTS = Barnstable/Yarmouth Transportation Study

SRot = Sagamore Rotary Study

ITS = Intelligent Transportation Systems Study

MCS = Monomoy Capacity Study

OCS = Outer Cape Capacity Study

6A = Route 6A Corridor Management Plan

Safe = Cape Cod Accident Record Information System

TDF = Travel Demand Forecast

LCP = Local Comprehensive Plan

RPA = CCC Staff
MHD = Mass Highway Dept
MS = Management Systems
PUB = Public Input

Conformity Information

Status

Exempt

Type

B - Operating and Maintenance

AQ Analysis Yr

N

Projects Analysis

1

RTP# 901

Bridge BUNDLED

Description BUNDLED PROJECTS
Bridge Replacement/Reconstruction

Annual Cost \$750,000 RTP Projected Cost
Upfront Cost \$17,250,000

Score

-

Project I.D.

SECTION 1 - DESCRIPTIVE

Goal Compatibility Analysis

goal 1 Compatible
goal 2 Compatible
goal 3 Compatible
goal 4 Compatible
goal 5 Compatible

Compatibility
Compatible

Benefits Analysis

VMT Reduction

VHT Reduction

Emissions Reduction VOC

Emissions Reduction NOx

Comments/Recommendations

Travel Miles
Travel Hours
Safety 30.0

Air Quality
Systems Mgmt 50.0
Infrastructure 60.0

Environment

Mode Shift

Access Mgmt

Benefit Level 140.0

Generally Compatible - Benefits of individual projects will vary. Cost analysis based on 1997 TIP, 3 projects.

Methodology to be enhanced with results of State Bridge management system.

Source of Origin

MS

KEY: SBP = State Bike Plan

SPP = State Pedestrian Plan

JTC = Cape Cod Joint Transportation Committee

28 = Route 28 Corridor Study

CMS = Congestion Management System

BYTS = Barnstable/Yarmouth Transportation Study

SRot = Sagamore Rotary Study

ITS = Intelligent Transportation Systems Study

MCS = Monomoy Capacity Study

OCS = Outer Cape Capacity Study

6A = Route 6A Corridor Management Plan

Safe = Cape Cod Accident Record Information System

TDF = Travel Demand Forecast

LCP = Local Comprehensive Plan

RPA = CCC Staff
MHD = Mass Highway Dept
MS = Management Systems
PUB = Public Input

Conformity Information

Status

Exempt

Type

B - Operating and Maintenance

AO Analysis Yr

N

Projects Analysis

SECTION 1 - DESCRIPTIVE

SECTION 2 - QUANTITATIVE

1

RTP# 902 Transit BUNDLED

Description BUNDLED PROJECTS
Transit Operating Assistance & Bus Replacement

Annual Cost \$5,334,483 RTP Projected Cost
Upfront Cost \$122,693,109

Score

Project I.D.

Goal Compatibility Analysis

goal 1 Compatible
goal 2 Compatible
goal 3 Compatible
goal 4 Compatible
goal 5 Compatible

Compatibility
Compatible

Benefits Analysis

Travel Miles 576.9
Travel Hours 600.0
Safety 100.0
Air Quality 1,167.9
Systems Mgmt 50.0
Infrastructure 10.0
Environment 5.0
Mode Shift 50.0
Access Mgmt

VMT Reduction 15,000

VHT Reduction 600

Emissions Reduction VOC 19,605

Emissions Reduction NOx 24,675

Comments/Recommendations

Generally Compatible - Benefits of individual projects will vary. Project includes continued operation of current level of service such as SeaLine, capital purchases, etc. Cost analysis based on 1997 TIP.

Methodology to be enhanced. Assumes fare box return offsets unused capacity.

Benefit Level 2,559.9

KEY: SBP = State Bike Plan
SPP = State Pedestrian Plan
JTC = Cape Cod Joint Transportation Committee
28 = Route 28 Corridor Study
CMS = Congestion Management System
BYTS = Barnstable/Yarmouth Transportation Study
SRot = Sagamore Rotary Study
ITS = Intelligent Transportation Systems Study
MCS = Monomoy Capacity Study
OCS = Outer Cape Capacity Study
6A = Route 6A Corridor Management Plan
Safe = Cape Cod Accident Record Information System
TDF = Travel Demand Forecast
LCP = Local Comprehensive Plan

Source of Origin

MS

RPA = CCC Staff
MHD = Mass Highway Dept
MS = Management Systems
PUB = Public Input

Conformity InformationStatus

Exempt

Type

B - Operating and Maintenance

AO Analysis Yr

N

Projects Analysis

P

RTP# 903

Intersection BUNDLED

Description BUNDLED PROJECTS
Intersection Improvements

Annual Cost \$775,000

RTP Projected Cost

Upfront Cost

\$17,825,000

Score

-

Project I.D.

SECTION 1 - DESCRIPTIVE

Goal Compatibility Analysis

goal 1 Compatible
goal 2 Compatible
goal 3 Compatible
goal 4 Compatible
goal 5 Compatible

Compatibility
Compatible

Benefits Analysis

VMT Reduction

VHT Reduction 140

Emissions Reduction VOC

Emissions Reduction NOx

Comments/Recommendations

Limited Compatibility - Benefits of individual projects will vary. Cost analysis based on 1997 TIP, 5 projects.

Methodology to include HCM analysis assumes a typical 250,000 improvement results in a VHT savings of 45 each.

Travel Miles

Travel Hours 140.0

Safety 75.0

Air Quality

Systems Mgmt 75.0

Infrastructure 25.0

Environment

Mode Shift

Access Mgmt 10.0

Benefit Level 325.0

SECTION 2 - QUANTITATIVE

Source of Origin

MS

KEY: SBP = State Bike Plan

SPP = State Pedestrian Plan

JTC = Cape Cod Joint Transportation Committee

28 = Route 28 Corridor Study

CMS = Congestion Management System

BYTS = Barnstable/Yarmouth Transportation Study

SRot = Sagamore Rotary Study

ITS = Intelligent Transportation Systems Study

MCS = Monomoy Capacity Study

OCS = Outer Cape Capacity Study

6A = Route 6A Corridor Management Plan

Safe = Cape Cod Accident Record Information System

TDF = Travel Demand Forecast

LCP = Local Comprehensive Plan

RPA = CCC Staff

MHD = Mass Highway Dept

MS = Management Systems

PUB = Public Input

Conformity Information

Status

Exempt

Type

B - Operating and Maintenance

AQ Analysis Yr

N

Projects Analysis

1

RTP# 904

Bicycle/Pedestrian Projects BUNDLED

Description BUNDLED PROJECTS - bicycle and/or pedestrian facilities and programs

Annual Cost \$250,000

RTP Projected Cost

Upfront Cost

\$5,750,000

Score

-

Project I.D.

SECTION 1 - DESCRIPTIVE

Goal Compatibility Analysis

goal 1 Compatible
goal 2 Compatible
goal 3 Compatible
goal 4 Compatible
goal 5 Compatible

Compatibility
Compatible

Benefits Analysis

Travel Miles

Travel Hours

Safety

Air Quality

Systems Mgmt 30.0

Infrastructure

Environment

Mode Shift 30.0

Access Mgmt

Benefit Level 60.0

VMT Reduction

VHT Reduction

Emissions Reduction VOC

Emissions Reduction NOx

Comments/Recommendations

SECTION 2 - QUANTITATIVE

Source of Origin

SBP, SPP

KEY: SBP = State Bike Plan
SPP = State Pedestrian Plan
JTC = Cape Cod Joint Transportation Committee
28 = Route 28 Corridor Study
CMS = Congestion Management System
BYTS = Barnstable/Yarmouth Transportation Study
SRot = Sagamore Rotary Study
ITS = Intelligent Transportation Systems Study
MCS = Monomoy Capacity Study
OCS = Outer Cape Capacity Study
6A = Route 6A Corridor Management Plan
Safe = Cape Cod Accident Record Information System
TDF = Travel Demand Forecast
LCP = Local Comprehensive Plan

RPA = CCC Staff
MHD = Mass Highway Dept
MS = Management Systems
PUB = Public Input

Conformity Information

Status

Exempt

Type

A - Capital Improvements

AQ Analysis Yr

N

Projects Analysis

1

SECTION 1 - DESCRIPTIVE

RTP# 905 Access Management BUNDLED

Description Eligible for all state and local numbered routes. Curb cut consolidation, medians, other access improvements

Annual Cost \$500,000 RTP Projected Cost
Upfront Cost \$11,500,000

Score
-
Project I.D.

Goal Compatibility Analysis

goal 1 Compatible		<u>Compatibility</u> Compatible
goal 2 Compatible		
goal 3 Compatible		
goal 4 Compatible		
goal 5 Compatible		

SECTION 2 - QUANTITATIVE

Benefits Analysis

Travel Miles		VMT Reduction
Travel Hours		VHT Reduction
Safety	50.0	Emissions Reduction VOC
Air Quality		Emissions Reduction NOx
Systems Mgmt	100.0	
Infrastructure		
Environment		
Mode Shift		
Access Mgmt	200.0	
Benefit Level	350.0	

Comments/Recommendations

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TDF = Travel Demand Forecast
LCP = Local Comprehensive Plan

Source of Origin
MS

Conformity Information

Status
Exempt
Type
B - Operating and Maintenance
AO Analysis Yr
N

RPA = CCC Staff
MHD = Mass Highway Dept
MS = Management Systems
PUB = Public Input

Projects Analysis

1

RTP# 907

TDM/TSM BUNDLED

Description BUNDLED PROJECTS - Travel Demand Management/Transportation Systems Management projects

Annual Cost \$500,000

RTP Projected Cost

Upfront Cost

\$11,500,000

Score

-

Project I.D.

SECTION 1 - DESCRIPTIVE

Goal Compatibility Analysis

goal 1 Compatible
goal 2 Compatible
goal 3 Compatible
goal 4 Compatible
goal 5 Compatible

Compatibility
Compatible

Benefits Analysis

VMT Reduction

VHT Reduction

Emissions Reduction VOC

Emissions Reduction NOx

Comments/Recommendations

Travel Miles

Travel Hours

Safety

Air Quality

Systems Mgmt 15.0

Infrastructure

Environment

Mode Shift 10.0

Access Mgmt

Benefit Level 25.0

SECTION 2 - QUANTITATIVE

Source of Origin

MS

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Conformity Information

Status

Exempt

Type

B - Operating and Maintenance

AQ Analysis Yr

N

1

SECTION 1 - DESCRIPTIVE

RTP# 908

New Ferry Service - BUNDLED

Description BUNDLED PROJECTS - Passenger ferries connecting Cape Cod harbors

Annual Cost \$250,000

RTP Projected Cost

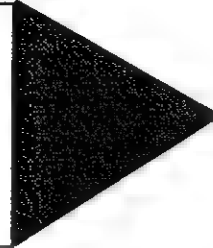
Upfront Cost

\$5,750,000

Score
-
Project I.D.

Goal Compatibility Analysis

goal 1 Compatible
goal 2 Compatible
goal 3 Compatible
goal 4 Compatible
goal 5 Compatible



Compatibility
Compatible

SECTION 2 - QUANTITATIVE

Benefits Analysis

Travel Miles 19.2
Travel Hours 15.0
Safety
Air Quality
Systems Mgmt 10.0
Infrastructure
Environment
Mode Shift 10.0
Access Mgmt

VMT Reduction 500

VHT Reduction 15

Emissions Reduction VOC

Emissions Reduction NOx

Comments/Recommendations

Further study is ongoing... pending outcome of Marine Transportation study.
•Cost information preliminary estimate

Benefit Level 54.2

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Source of Origin

RPA, PUB

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Conformity Information

Status

Recommended for Study

Type

B - Operating and Maintenance

AQ Analysis Yr

N

Projects Analysis

1

RTP# 909

Regional Bike Network BUNDLED

Description BUNDLED PROJECTS - Regional links of bicycle trails and inter-town paths

Annual Cost \$50,000

RTP Projected Cost

Upfront Cost \$8,000,000

\$9,150,000

Score

-

Project I.D.

SECTION 1 - DESCRIPTIVE

Goal Compatibility Analysis

goal 1 Compatible
goal 2 Compatible
goal 3 Compatible
goal 4 Compatible
goal 5 Compatible

Compatibility

Compatible

Benefits Analysis

VMT Reduction

VHT Reduction

Emissions Reduction VOC

Emissions Reduction NOx

Comments/Recommendations

Includes expansions of regional bike path network to include Bourne to Falmouth, Falmouth to Hyannis, Barnstable to Bourne

Travel Miles

Travel Hours

Safety

Air Quality

Systems Mgmt

Infrastructure

Environment

Mode Shift

Access Mgmt

Benefit Level

SECTION 2 - QUANTITATIVE

Source of Origin

SBP

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Conformity Information

Status

Exempt

Type

A - Capital Improvements

AQ Analysis Yr

N

Projects Analysis

SECTION 1 - DESCRIPTIVE

SECTION 2 - QUANTITATIVE

2

RTP# 1000

Cape Cod Rail Trail Bridges

Description Cape Cod Rail trail bridges over Route 6 in Harwich and Orleans

Annual Cost

Upfront Cost

\$1,000,000

RTP Projected Cost

\$1,000,000

Score

1,200

Project I.D.

CCC006

Goal Compatibility Analysis

goal 1 Compatible
goal 2 Compatible
goal 3 Compatible
goal 4 Compatible
goal 5 Compatible

Compatibility
Compatible

Benefits Analysis

Travel Miles
Travel Hours
Safety 10.0
Air Quality
Systems Mgmt 100.0
Infrastructure
Environment 5.0
Mode Shift 5.0
Access Mgmt

Benefit Level 120.0

VMT Reduction

VHT Reduction

Emissions Reduction VOC

Emissions Reduction NOx

Comments/Recommendations

A high regional priority - provides key connections in bicycle transportation system.

Benefits are estimated. Air Quality analysis may be estimated.

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Source of Origin

SBP

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MS = Management Systems

PUB = Public Input

Conformity InformationStatus

Exempt

Type

A - Capital Improvements

AO Analysis Yr

N

Projects Analysis

2

RTP# 1001

Hyannis Intermodal Center - ph. 1

Score

655

Project I.D.

9606

Description Construction of facility for inter-city bus and rail operations with shuttles to airport & ferries, pedestrian links to downtown Hyannis.

Annual Cost

RTP Projected Cost

Upfront Cost \$4,062,500

\$4,062,500

Goal Compatibility Analysis

goal 1 Compatible
goal 2 Compatible
goal 3 Compatible
goal 4 Compatible
goal 5 Compatible

Compatibility

Compatible

Benefits Analysis

VMT Reduction 1,000

VHT Reduction 50

Emissions Reduction VOC 1,300

Emissions Reduction NOx 1,650

Travel Miles 38.5

Travel Hours 50.0

Safety 5.0

Air Quality 77.8

Systems Mgmt 50.0

Infrastructure 10.0

Environment 10.0

Mode Shift 25.0

Access Mgmt

Benefit Level 266.2

Comments/Recommendations

Planning ANALYSIS

• All benefits are estimates. Benefits are for first phase only.

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Source of Origin

BYTS

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Conformity Information

Status

Non-Exempt*

Type

A - Capital Improvements

AQ Analysis Yr

Y-2020

Projects Analysis

2

RTP# 1002

Hyannis Intermodal Center - ph. 2+

Score

655

Project I.D.

Description Completion of facility for inter-city bus and rail operations with shuttles to airport & ferries, pedestrian links to downtown Hyannis.

Annual Cost

RTP Projected Cost

Upfront Cost \$4,062,500

\$4,062,500

Goal Compatibility Analysis

goal 1 Compatible
goal 2 Compatible
goal 3 Compatible
goal 4 Compatible
goal 5 Compatible

Compatibility
Compatible

Benefits Analysis

Travel Miles 38.5
Travel Hours 50.0
Safety 5.0
Air Quality 77.8
Systems Mgmt 50.0
Infrastructure 10.0
Environment 10.0
Mode Shift 25.0
Access Mgmt

Benefit Level 266.2

VMT Reduction 1,000

VHT Reduction 50

Emissions Reduction VOC 1,300

Emissions Reduction NOx 1,650

Comments/Recommendations

Planning ANALYSIS

All benefits are estimates. Benefits are for remaining phases only (beyond phase 1).

Source of Origin

BYTS

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Conformity Information

Status

Non-Exempt*

Type

A - Capital Improvements

AQ Analysis Yr

Y-2020

Projects Analysis

2

RTP# 1003

Exit 6 1/2 - Hyannis Access

Score

n/a

Project I.D.

Description Barnstable - new interchange on Route 6 between exits 6 & 7 to improve access to downtown Hyannis

Annual Cost

RTP Projected Cost

Upfront Cost \$15,000,000

\$15,000,000

Goal Compatibility Analysis

goal 1

goal 2

goal 3

goal 4

goal 5

Compatibility

Insufficient information - compatibility not determined at this time

Benefits Analysis

VMT Reduction 1,495

VHT Reduction 446

Emissions Reduction VOC 6,886

Emissions Reduction NOx 2,092

Comments/Recommendations

Continue alternatives/feasibility studies.

- For roadways from proposed interchange to Hyannis, land use issues to protect capacity
- Other projects as a group (RTP# 1001, 1002, 1012, 1022, 1023) would accomplish substantially the same goal.

Travel Miles 57.5
Travel Hours 446.0
Safety 10.0
Air Quality 257.3
Systems Mgmt 25.0
Infrastructure
Environment
Mode Shift
Access Mgmt

Benefit Level 795.8

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Conformity Information

Status

Recommended for Study

Type

A - Capital Improvements

AO Analysis Yr

N

Projects Analysis

2

RTP# 1004 Southside Connector

Score

n/a

Project I.D.

Description Bourne/Sandwich - Construction of a new divided highway between the Bourne Rotary and Route 6 near interchange 2

Annual Cost

RTP Projected Cost

Upfront Cost \$100,000,000

\$100,000,000

Goal Compatibility Analysis

goal 1 Incompatible
goal 2
goal 3 Incompatible
goal 4 Incompatible
goal 5

Compatibility

Compatibility not demonstrated

Benefits Analysis

Travel Miles 33.1
Travel Hours 589.0
Safety 50.0
Air Quality 446.9
Systems Mgmt 25.0
Infrastructure
Environment
Mode Shift
Access Mgmt 10.0

VMT Reduction 860

VHT Reduction 589

Emissions Reduction VOC 13,960

Emissions Reduction NOx 1,027

Comments/Recommendations

Drop from consideration at this time

Benefit Level 1,154.0

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Conformity Information

Status

Type

- Other

AQ Analysis Yr

Projects Analysis

2

RTP# 1005

Nickerson Park Access from Route 6

Description Brewster - Direct access via new interchange to Nickerson Park from Route 6

Score

n/a

Project I.D.

Annual Cost

RTP Projected Cost

Upfront Cost \$15,000,000

\$15,000,000

Goal Compatibility Analysis

goal 1

goal 2

goal 3

goal 4

goal 5

Compatibility

Insufficient information -
compatibility not determined at this
time

Benefits Analysis

Travel Miles 11.6

Travel Hours 19.0

Safety

Air Quality 29.3

Systems Mgmt 50.0

Infrastructure

Environment

Mode Shift

Access Mgmt

Benefit Level 109.9

VMT Reduction 302

VHT Reduction 19

Emissions Reduction VOC 588

Emissions Reduction NOx 492

Comments/Recommendations

Perform alternatives & feasibility analysis
CMS v/c: avg 0.86, max 1.10

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Conformity Information

Status

Type

- Other

AO Analysis Yr

SECTION 1 - DESCRIPTIVE

SECTION 2 - QUANTITATIVE

Projects Analysis

2

RTP# 1008

Rt 6 Reconfigure Interchange One

Description Improve westbound on-ramp near Sagamore Bridge during peak times for off-cape traffic flow

Score

333

Project I.D.

Annual Cost \$50,000

RTP Projected Cost

Upfront Cost

\$1,150,000

Goal Compatibility Analysis

goal 1 Compatible
goal 2 Compatible
goal 3 Compatible
goal 4 Compatible
goal 5 Compatible

Compatibility
Compatible

Benefits Analysis

Travel Miles -10.2
Travel Hours 31.2
Safety 15.0
Air Quality -17.7
Systems Mgmt 10.0
Infrastructure
Environment
Mode Shift
Access Mgmt 10.0

Benefit Level 38.3

VMT Reduction -264

VHT Reduction 31

Emissions Reduction VOC -239

Emissions Reduction NOx -451

Comments/Recommendations

VMT/VHT/Emissions are 20% of modeled output (since closings would be temporary)

Possible alternatives include ramp metering, temporary closures during congested periods

Source of Origin

SRot, RPA

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Conformity Information

Status

Recommended for Study

Type

A - Capital Improvements

AO Analysis Yr

N

Projects Analysis

2

RTP# 1009

Sagamore Rotary Reconfiguration

Score

n/a

Project I.D.

Description Reconfiguration of Sagamore Rotary to allow traffic between Rt 3 and Sagamore Bridge to pass over or under the existing rotary

Annual Cost

RTP Projected Cost

Upfront Cost \$30,000,000

\$30,000,000

Goal Compatibility Analysis

goal 1

goal 2

goal 3

goal 4

goal 5

Compatibility

Insufficient information - compatibility not determined at this time

Benefits Analysis

VMT Reduction -161

VHT Reduction 1,522

Emissions Reduction VOC 32,885

Emissions Reduction NOx -1,809

Travel Miles -6.2

Travel Hours 1,522.0

Safety 100.0

Air Quality 954.4

Systems Mgmt 25.0

Infrastructure

Environment

Mode Shift 25.0

Access Mgmt 100.0

Benefit Level 2,720.2

Comments/Recommendations

Continue with alternatives & feasibility analysis
 • Assumes high-speed direct flyover w/other geometric changes.
 Examine use of ramp-metering to improve flow during peak hours and congestion pricing of crossing canal.

Source of Origin

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Conformity Information

Status

Recommended for Study

Type

A - Capital Improvements

AQ Analysis Yr

N

Projects Analysis

2 RTP# 1010 Bourne Rotary Reconfiguration

Description Bourne - reconfigure Bourne rotary to allow traffic between Bourne Bridge to Route 28 (MacArthur Blvd)

Score

n/a

Project I.D.

Annual Cost

RTP Projected Cost

Upfront Cost \$30,000,000

\$30,000,000

Goal Compatibility Analysis

goal 1

goal 2

goal 3

goal 4

goal 5

Compatibility

Insufficient information -
compatibility not determined at this
time

Benefits Analysis

Travel Miles -2.0

Travel Hours 89.5

Safety 100.0

Air Quality 42.7

Systems Mgmt 25.0

Infrastructure

Environment 25.0

Mode Shift

Access Mgmt 100.0

Benefit Level 380.3

VMT Reduction -51

VHT Reduction 90

Emissions Reduction VOC 1,599

Emissions Reduction NOx -246

Comments/Recommendations

Continue with alternatives & feasibility study.
Examine use of ramp-metering to improve flow
during peak hours and congestion pricing of
crossing canal.

Source of Origin

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PUB = Public Input

Conformity Information

Status

Recommended for Study

Type

A - Capital Improvements

AQ Analysis Yr

N

Projects Analysis

2

RTP# 1011

Attucks Way Extension

Description Barnstable - Construction of new roadway connecting Attucks Way to Old Rt 132

Score

528

Project I.D.

Annual Cost

RTP Projected Cost

Upfront Cost \$2,500,000

\$2,500,000

Goal Compatibility Analysis

goal 1 Compatible
goal 2 Compatible
goal 3 Compatible
goal 4 Compatible
goal 5 Compatible

Compatibility

Compatible

Benefits Analysis

VMT Reduction 428

VHT Reduction 93

Emissions Reduction VOC -1,177

Emissions Reduction NOx -78

Comments/Recommendations

Continue to develop design & identify appropriate access/land use controls.

•On Rt 132: CMS v/c 1.08

Travel Miles 16.5

Travel Hours 93.1

Safety 25.0

Air Quality -37.5

Systems Mgmt 10.0

Infrastructure

Environment

Mode Shift

Access Mgmt 25.0

Benefit Level 132.1

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Source of Origin

BYTS

RPA = CCC Staff

MHD = Mass Highway Dept

MS = Management Systems

PUB = Public Input

Conformity Information

Status

Non-Exempt

Type

A - Capital Improvements

AO Analysis Yr

Y-2000

Projects Analysis

2

RTP# 1012 Rt 132 Boulevard

Description Barnstable - Construction of 2 new lanes from Rt 6 to
Bearses Way

Score

451

Project I.D.

Annual Cost

RTP Projected Cost

Upfront Cost \$7,500,000

\$7,500,000

Goal Compatibility Analysis

goal 1 Compatible
goal 2 Compatible
goal 3 Compatible
goal 4 Compatible
goal 5 Compatible

Compatibility
Compatible

Benefits Analysis

Travel Miles 0.8
Travel Hours 93.9
Safety 100.0
Air Quality 18.4
Systems Mgmt
Infrastructure
Environment
Mode Shift 25.0
Access Mgmt 100.0

Benefit Level 338.1

VMT Reduction 20

VHT Reduction 94

Emissions Reduction VOC 834

Emissions Reduction NOx -295

Comments/Recommendations

Conduct preliminary analysis... Could be
compatible with appropriate design &
conditions.
•Assumes improved transit & alt. mode travel
•CMS avg. 0.87

Source of Origin

CMS, TDF

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Conformity Information

Status

Non-Exempt

Type

A - Capital Improvements

AQ Analysis Yr

Y-2010

Projects Analysis

2

SECTION 1 - DESCRIPTIVE

RTP# 1014

Cape Cod Rail Trail Resurface & Widen

Description Eastham to Dennis - Resurface and widen original rail trail to 12'

Score
1,200
Project I.D.

Annual Cost	RTP Projected Cost
Upfront Cost \$1,000,000	\$1,000,000

Goal Compatibility Analysis

goal 1 Compatible		<u>Compatibility</u> Compatible
goal 2 Compatible		
goal 3 Compatible		
goal 4 Compatible		
goal 5 Compatible		

SECTION 2 - QUANTITATIVE

Benefits Analysis

Travel Miles	
Travel Hours	
Safety	20.0
Air Quality	
Systems Mgmt	50.0
Infrastructure	
Environment	
Mode Shift	50.0
Access Mgmt	

Benefit Level 120.0

VT Reduction

VHT Reduction

Emissions Reduction VOC

Emissions Reduction NOx

Comments/Recommendations

currently 200 bikes/hr @ Nickerson

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Conformity Information

Status

Exempt

Type

A - Capital Improvements

AQ Analysis Yr

N

Projects Analysis

2

RTP# 1015

Cape Cod Rail Trail Extensions

Description Extend Cape Cod Rail Trail to Provincetown in the north,
Hyannis in the west

Score

525

Project I.D.

Annual Cost

RTP Projected Cost

Upfront Cost \$4,000,000

\$4,000,000

Goal Compatibility Analysis

goal 1 Compatible
goal 2 Compatible
goal 3 Compatible
goal 4 Compatible
goal 5 Compatible

Compatibility
Compatible

Benefits Analysis

VMT Reduction

VHT Reduction

Emissions Reduction VOC

Emissions Reduction NOx

Comments/Recommendations

Travel Miles

Travel Hours

Safety 50.0

Air Quality

Systems Mgmt 50.0

Infrastructure 10.0

Environment 50.0

Mode Shift 50.0

Access Mgmt

Benefit Level 210.0

KEY: SBP = State Bike Plan

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6A = Route 6A Corridor Management Plan

Safe = Cape Cod Accident Record Information System

TDF = Travel Demand Forecast

LCP = Local Comprehensive Plan

Source of Origin

SBP

RPA = CCC Staff

MHD = Mass Highway Dept

MS = Management Systems

PUB = Public Input

Conformity Information

Status

Exempt

Type

A - Capital Improvements

AO Analysis Yr

N

Projects Analysis

2

RTP# 1016

Rt 28 Bike Accommodation -

Description Construction, marking, and signage of Bicycle facility along Route 28

Score

454

Project I.D.

Annual Cost

RTP Projected Cost

Upfront Cost \$5,000,000

\$5,000,000

Goal Compatibility Analysis

goal 1 Compatible
goal 2 Compatible
goal 3 Compatible
goal 4 Compatible
goal 5 Compatible

Compatibility

Compatible

Benefits Analysis

VMT Reduction 25

VHT Reduction 1

Emissions Reduction VOC

Emissions Reduction NOx

Comments/Recommendations

Review of Bicyclist accidents shows Rt 28 in Yarmouth as single highest section of road on Cape. Distances and land uses (motels & tourist based businesses) make biking a viable mode choice.

VMT/VHT/VOC/NOx reductions are preliminary estimates.

Travel Miles 1.0

Travel Hours 1.0

Safety 100.0

Air Quality

Systems Mgmt 50.0

Infrastructure

Environment

Mode Shift 75.0

Access Mgmt

Benefit Level 227.0

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LCP = Local Comprehensive Plan

Source of Origin

Safe

RPA = CCC Staff

MHD = Mass Highway Dept

MS = Management Systems

PUB = Public Input

Conformity Information

Status

Exempt

Type

A - Capital Improvements

AQ Analysis Yr

N

Projects Analysis

SECTION 1 - DESCRIPTIVE

SECTION 2 - QUANTITATIVE

RTP# 1021 Rt 6A Shuttle Service

Description Public transit shuttle connecting villages along Route 6A from Sandwich to Orleans

Annual Cost \$100,000 RTP Projected Cost
Upfront Cost \$2,300,000

Score

349

Project I.D.

Goal Compatibility Analysis

goal 1 Compatible
goal 2 Compatible
goal 3 Compatible
goal 4 Compatible
goal 5 Compatible

Compatibility
Compatible

Benefits Analysis

Travel Miles 7.7
Travel Hours 10.0
Safety
Air Quality 2.7
Systems Mgmt
Infrastructure 10.0
Environment
Mode Shift 50.0
Access Mgmt

VMT Reduction 200

VHT Reduction 10

Emissions Reduction VOC 50

Emissions Reduction NOx 50

Comments/Recommendations

To include review of Rt.6A Alternate Modes study

VMT/VHT Air quality analyses is preliminary

Benefit Level 80.4

Source of Origin

6A

RPA = CCC Staff
MHD = Mass Highway Dept
MS = Management Systems
PUB = Public Input

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Conformity Information

Status

Exempt

Type

B - Operating and Maintenance

AO Analysis Yr

N

Projects Analysis

2 RTP# 1022 Transportation Management Center

Description Operations center to monitor traffic operations, issue real-time reports to traveling public, control variable message signs and coordinated traffic signals

Annual Cost		RTP Projected Cost
Upfront Cost	\$6,450,000	\$6,450,000

Score
413
Project I.D.

Goal Compatibility Analysis

goal 1 Compatible
goal 2 Compatible
goal 3 Compatible
goal 4 Compatible
goal 5 Compatible

Compatibility
Compatible

Benefits Analysis

Travel Miles	38.5
Travel Hours	50.0
Safety	15.0
Air Quality	77.8
Systems Mgmt	50.0
Infrastructure	
Environment	10.0
Mode Shift	25.0
Access Mgmt	

VTMT Reduction 1,000

VHT Reduction 50

Emissions Reduction VOC 1,300

Emissions Reduction NOx 1,650

Comments/Recommendations

preliminary VMT/VHT/air quality analysis

Includes the following modules:

1. Traveler information Center
2. Tourist information Center
3. Transit Management Center
4. Smart Card Settlement Center

Benefit Level 266.2

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Source of Origin

ITS

RPA = CCC Staff
MHD = Mass Highway Dept
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PUB = Public Input

Conformity Information

Status

Exempt

Type

A - Capital Improvements

AQ Analysis Yr

N

Projects Analysis

2

RTP# 1023

Variable Message Signs

Score

1,197

Project I.D.

Description Remote operated variable message signs installed along all major routes - Rt 6, Rt 28 in Bourne & Falmouth, Rt 25 Extension, Rt 3

Annual Cost \$10,000

RTP Projected Cost

Upfront Cost \$200,000

\$430,000

Goal Compatibility Analysis

goal 1 Compatible
goal 2 Compatible
goal 3 Compatible
goal 4 Compatible
goal 5 Compatible

Compatibility
Compatible

Benefits Analysis

Travel Miles 12.5
Travel Hours 7.5
Safety 5.0
Air Quality 21.5
Systems Mgmt 5.0
Infrastructure
Environment
Mode Shift
Access Mgmt

VMT Reduction 325

VHT Reduction 8

Emissions Reduction VOC 278

Emissions Reduction NOx 562

Comments/Recommendations

Based on Barnstable 1997 CMAQ project
"Hyannis Trans-Guide"

Benefit Level 51.5

Source of Origin

ITS

RPA = CCC Staff
MHD = Mass Highway Dept
MS = Management Systems
PUB = Public Input

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Conformity InformationStatus

Exempt

Type

B - Operating and Maintenance

AQ Analysis Yr

Y-2000 (CMAQ)

Projects Analysis

SECTION 1 - DESCRIPTIVE

2

RTP# 1024 Permanent Traffic Counting Stations

Description Install permanent traffic counting stations at strategic locations Cape-wide

Annual Cost	\$1,000	RTP Projected Cost
Upfront Cost	\$80,000	\$103,000

Score
97
Project I.D.

Goal Compatibility Analysis

goal 1 Compatible
goal 2 Compatible
goal 3 Compatible
goal 4 Compatible
goal 5 Compatible

Compatibility
Compatible

SECTION 2 - QUANTITATIVE

Benefits Analysis

Travel Miles
Travel Hours
Safety
Air Quality
Systems Mgmt 1.0
Infrastructure
Environment
Mode Shift
Access Mgmt

VMT Reduction

VHT Reduction

Emissions Reduction VOC

Emissions Reduction NOx

Comments/Recommendations

16 locations referred to in appendix

Benefit Level 1.0

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OCS = Outer Cape Capacity Study
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Safe = Cape Cod Accident Record Information System
TDF = Travel Demand Forecast
LCP = Local Comprehensive Plan

Source of Origin

RPA, JTC

RPA = CCC Staff
MHD = Mass Highway Dept
MS = Management Systems
PUB = Public Input

Conformity Information

Status

Exempt

Type

B - Operating and Maintenance

AQ Analysis Yr

N

Projects Analysis

SECTION 1 - DESCRIPTIVE

SECTION 2 - QUANTITATIVE

2

RTP# 1027

Safety Improvements Rt 6

Description Dennis to Orleans - Implement improvements to Route 6 from Dennis to Orleans that preserve the character of the region while having a clear safety benefit

Annual Cost

RTP Projected Cost

Upfront Cost \$12,000,000

\$12,000,000

Score

83

Project I.D.

Goal Compatibility Analysis

goal 1 Compatible
goal 2 Compatible
goal 3 Compatible
goal 4 Compatible
goal 5 Compatible

Compatibility
Compatible

Benefits Analysis

VMT Reduction

VHT Reduction

Emissions Reduction VOC

Emissions Reduction NOx

Comments/Recommendations

Travel Miles

Travel Hours

Safety 100.0

Air Quality

Systems Mgmt

Infrastructure

Environment

Mode Shift

Access Mgmt

Benefit Level 100.0

Includes Interchange 9 - completion of cloverleaf; center barrier; drainage improvements; transition area improvements; interchange 10-12 improvements

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LCP = Local Comprehensive Plan

Source of Origin

MHD

RPA = CCC Staff

MHD = Mass Highway Dept

MS = Management Systems

PUB = Public Input

Conformity InformationStatus

Exempt

Type

B - Operating and Maintenance

AQ Analysis Yr

N

Projects Analysis

SECTION 1 - DESCRIPTIVE

SECTION 2 - QUANTITATIVE

RTP# 1029

Telecommuting Center

Description Demonstration Project - Cape Cod center w/telecommuting equipment (computers/modems/fax, etc.) to reduce trips to off-cape employment centers.

Annual Cost

RTP Projected Cost

Upfront Cost

\$250,000

\$250,000

Score

1,105

Project I.D.

Goal Compatibility Analysis

goal 1 Compatible
goal 2 Compatible
goal 3 Compatible
goal 4 Compatible
goal 5 Compatible

Compatibility

Compatible

Benefits Analysis

VMT Reduction 250

VHT Reduction 10

Travel Miles 9.6

Emissions Reduction VOC

Travel Hours 10.0

Emissions Reduction NOx

Safety

Comments/Recommendations

Air Quality

Systems Mgmt 3.0

Based on office requirements for 40 employees
• VMT/VHT preliminary estimates

Infrastructure

Environment

Mode Shift 5.0

Access Mgmt

Benefit Level 27.6

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Source of Origin

ITS

RPA = CCC Staff
MHD = Mass Highway Dept
MS = Management Systems
PUB = Public Input

Conformity InformationStatus

Exempt

Type

A - Capital Improvements

AQ Analysis Yr

N

Projects Analysis

2

RTP# 1030 Land Conservation

Description Strategic purchase of land to reduce sprawl and inefficient allocation of transportation resources

Annual Cost \$500,000

RTP Projected Cost

Upfront Cost

\$11,500,000

Score

190

Project I.D.

Goal Compatibility Analysis

goal 1 Compatible
goal 2 Compatible
goal 3 Compatible
goal 4 Compatible
goal 5 Compatible

Compatibility
Compatible

Benefits Analysis

VMT Reduction 867

VHT Reduction 35

Travel Miles 33.3

Travel Hours 34.6

Safety

Air Quality

Systems Mgmt 50.0

Infrastructure

Environment 50.0

Mode Shift

Access Mgmt 50.0

Benefit Level 217.9

Emissions Reduction VOC

Emissions Reduction NOx

Comments/Recommendations

Assumes \$50 K/acre - 10 acres/yr

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Safe = Cape Cod Accident Record Information System

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LCP = Local Comprehensive Plan

Source of Origin

MCS, OCS

RPA = CCC Staff

MHD = Mass Highway Dept

MS = Management Systems

PUB = Public Input

Conformity Information

Status

Exempt

Type

B - Operating and Maintenance

AQ Analysis Yr

N

Projects Analysis

2

RTP# 1031

Cape-wide Highway Advisory Radio

Description Provide travel information cape-wide via AM radio

Score

100

Project I.D.

Annual Cost

RTP Projected Cost

Upfront Cost

\$100,000

\$100,000

Goal Compatibility Analysis

goal 1 Compatible
goal 2 Compatible
goal 3 Compatible
goal 4 Compatible
goal 5 Compatible

Compatibility
Compatible

Benefits Analysis

VMT Reduction

VHT Reduction

Emissions Reduction VOC

Emissions Reduction NOx

Comments/Recommendations

Travel Miles

Travel Hours

Safety

Air Quality

Systems Mgmt 1.0

Infrastructure

Environment

Mode Shift

Access Mgmt

Benefit Level 1.0

To support Transportation Management Center

Source of Origin

ITS

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PUB = Public Input

Conformity Information

Status

Exempt

Type

A - Capital Improvements

AQ Analysis Yr

N

Projects Analysis

SECTION 1 - DESCRIPTIVE

SECTION 2 - QUANTITATIVE

2

RTP# 1035

Cape Cod Capacity Study

Description Cape-wide study using methods developed for the Outer Cape & Monomoy Area Capacity Studies

Annual Cost

Upfront Cost

\$50,000

RTP Projected Cost

\$50,000

Goal Compatibility Analysis

goal 1 Compatible
goal 2 Compatible
goal 3 Compatible
goal 4 Compatible
goal 5 Compatible

Compatibility
Compatible

Benefits Analysis

Travel Miles

Travel Hours

Safety

Air Quality

Systems Mgmt 1.0

Infrastructure

Environment

Mode Shift

Access Mgmt

Benefit Level 1.0

VMT Reduction

VHT Reduction

Emissions Reduction VOC

Emissions Reduction NOx

Comments/Recommendations

KEY: SBP = State Bike Plan
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Conformity Information

Status

Exempt

Type

A - Capital Improvements

AO Analysis Yr

N

Projects Analysis

2

RTP# 1037 Rt 6 Eastham - Safety Improvements

Description Eliminate conflict points along Route 6

Score

500

Project I.D.

Annual Cost

RTP Projected Cost

Upfront Cost \$1,200,000

\$1,200,000

Goal Compatibility Analysis

goal 1 Compatible
goal 2 Compatible
goal 3 Compatible
goal 4 Compatible
goal 5 Compatible

Compatibility
Compatible

Benefits Analysis

VMT Reduction

VHT Reduction

Emissions Reduction VOC

Emissions Reduction NOx

Comments/Recommendations

Travel Miles

Travel Hours

Safety 50.0

Air Quality

Systems Mgmt

Infrastructure

Environment

Mode Shift

Access Mgmt 10.0

Benefit Level 60.0

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TDF = Travel Demand Forecast

LCP = Local Comprehensive Plan

Source of Origin

LCP

RPA = CCC Staff

MHD = Mass Highway Dept

MS = Management Systems

PUB = Public Input

Conformity Information

Status

Recommended for Study

Type

A - Capital Improvements

AQ Analysis Yr

N

4.6.1. - Cape Cod Joint Transportation Committee Recommendations

In addition to the projects recommended by the Metropolitan Planning Organization in this plan, the following projects were recommended for inclusion in the plan by the Cape Cod Joint Transportation Committee (CCJTC). The inclusion of these projects in the plan was endorsed by the CCJTC in its meeting of February 14, 1997:

- *Third Highway Bridge Across the Cape Cod Canal in Bourne:* This project would entail the construction of an additional highway bridge over the Cape Cod Canal, possibly next to the Sagamore Bridge, to increase automobile capacity over the Canal.
Estimated Cost: \$500 million.
- *"Southside Connector" in Bourne/Sandwich:* This would be a limited access addition to State Route 25 that would cross the military reservation near Shawme Crowell State Forest, connecting the Bourne Bridge to Route 6 in between Exits 1 and 2.
Estimated Cost: \$100 million.

5. - Financing Issues

When needed transportation improvements go unfunded we still pay. We pay in lost time, harm to our air quality, in decreasing safety. To some degree, the magnitude, location, and type of needed improvements can be managed through responsible land use planning. The projects and costs listed at the end of this chapter are the best estimates of what is needed to satisfy the goals of the Regional Transportation Plan.

5.1. - General funding issues

Several mechanisms for funding are discussed below.

5.1.1. - Taxes vs. Chapter 90

Often, local transportation projects are funded through local taxes or apportionments from Massachusetts General Law - chapter 90.

5.1.2. - Betterment Districts

This technique allows communities to reimburse themselves for the expense of certain transportation improvements through an increase of taxes of property owners which directly benefit from the improvement.

5.1.3. - Impact Fees

As Cape towns develop their individual Local Comprehensive Plans, some are looking toward the possibility of imposing impact fees to help pay for facilities and infrastructure required to support growth and development. Section 15 of the Cape Cod Commission Act provides for the adoption of procedures for the municipalities and the Commission itself to calculate, assess, and impose impact fees.

Transportation impact fees are one-time assessments to fund the construction or expansion of facilities and infrastructure that benefit the development. Unlike taxes, impact fees are assessed for a specific use which has been created by a specific need and must be dedicated exclusively for this purpose. Existing deficiencies must be addressed outside of the Impact Fee System.

5.1.4. - County Gas Tax

This requires an act of the Massachusetts Legislature. Many issues must be addressed including the effect on the local economy and that of communities bordering the jurisdiction in which the tax is imposed.

5.2. - Fiscal Constraint

Projects listed on the following pages are organized first by "Bundled," then by project score. The cumulative cost is compared to the total Regional Transportation Plan funding amount. This amount is the sum of highway sources (\$629 million - based on information supplied by the Bureau of Transportation Planning & Development - see Table 5.0) and transit (\$56 million -based on 23 years of the

current annual average of approximately \$2.43 million). Under the assumptions used in the analysis, Cape Cod would receive an estimated \$685 million over the 23 year period from 1998-2020.

It is important to note that this analysis is based on the best available information. As new funding forecasts and sources become available, it is expected that needed improvements will move onto the list of recommended projects. For explanation of abbreviations please see the glossary in the appendix.

This fiscal analysis is based on the funding amounts used in the current year of the Transportation Improvement Program. Out of a total average program of \$ 29.8 million, almost 74% has been projected to basic maintenance and operation of transportation services, or to intersection improvements.

Table 5.0 - Summary of Funding Programmed for Massachusetts MPOs

(Source: Massachusetts Bureau of Transportation Planning & Development - Highway Sources)

TITLE 23
TRANSPORTATION FUNDING ESTIMATES
1998-2020

Federal Funds (\$657M/YR 1998-2000, \$450M/YR 2001-2020)	\$10,971,000,000
CA/T Needs (1998-2020, Federal Funds only) (Includes AC Conversions)	\$3,341,000,000
Statewide Infrastructure (Statewide Enhancement, TDM and Infrastructure projects)	\$348,000,000
Statewide Federal Program (Total Federal funds less CA/T, less Statewide Infrastructure)	\$7,282,000,000
Statewide Federal Program Plus State Match	\$9,102,500
State Bond Funds (NFA) (\$200M/YR 1998-2020)	\$4,600,000,000
Total MPO Resources * (Federal, State Match and State Bond Funds)	\$13,702,500,000

* Amount to be applied to MARPA Formula

MPO Estimates (percentages from MARPA Formula)

MPO	Formula	RTP Resources
BCRPC	3.56%	\$487,000,000
CCC	4.59%	\$629,000,000
CMRPC	8.69%	\$1,190,000,000
FCPC	2.54%	\$348,000,000
MVC	0.31%	\$43,000,000
MVPC	4.43%	\$607,000,000
MAPC	42.97%	\$5,889,000,000
MRPC	4.46%	\$611,000,000
NPEDC	0.22%	\$30,000,000
NMCOG	3.91%	\$535,000,000
OCPC	4.56%	625,000,000
PVPC	10.81%	\$1,481,000,000
SRPEDD	8.96%	\$1,228,000,000

It is expected that "Mega" projects will be included within the constraint of the RTP Resources for a MPO.

Please note that both cost and funds for the RTP should be for the period 1998-2020

I. Recommended Projects in the Cape Cod Regional Transportation Plan

Fiscal Conformity A. Capital Improvements B. Operating and Maintenance

Type	Project	Status	Cost	AQ Analysis Completion Yr
A	904 Bicycle/Pedestrian Projects BUNDLED	Exempt	\$5,750,000	N
A	906 Transportation Enhancements BUNDLED	Exempt	\$11,500,000	N
A	909 Regional Bike Network BUNDLED	Exempt	\$9,150,000	N
A	1000 Cape Cod Rail Trail Bridges	Exempt	\$1,000,000	N
A	1001 Hyannis Intermodal Center - ph. 1	Non-Exempt*	\$4,062,500	Y-1999
A	1002 Hyannis Intermodal Center - ph. 2+	Non-Exempt*	\$4,062,500	Y-2010
A	1006 Rt 28 MacArthur Boulevard Improvements*	Recommended for Study	\$10,000,000	Y-2020
A	1008 Rt 6 Reconfigure Interchange One	Recommended for Study	\$1,150,000	N
A	1011 Attucks Lane Extension	Non-Exempt	\$2,500,000	Y-1999
A	1012 Rt 132 Boulevard	Non-Exempt	\$7,500,000	Y-1999
A	1014 Cape Cod Rail Trail Resurface & Widen	Exempt	\$1,000,000	N
A	1015 Cape Cod Rail Trail Extensions	Exempt	\$4,000,000	N
A	1016 Rt 28 Bike Accommodation - Hyannis-Dennis	Exempt	\$5,000,000	N
A	1022 Transportation Management Center	Exempt	\$6,450,000	N
A	1025 Expand/enhance Exit 6 Park & Ride	Recommended for Study	\$1,000,000	N
A	1029 Telecommuting Center	Exempt	\$250,000	N
A	1031 Cape-wide Highway Advisory Radio	Exempt	\$100,000	N
A	1035 Cape Cod Capacity Study	Exempt	\$50,000	N
A	1036 Harwich/Chatham Rail Trail Extension	Exempt	\$985,000	N
A	1037 Rt 6 Eastham - Safety Improvements	Recommended for Study	\$1,200,000	N

Capital Improvements Sub-total = \$77 Million

B	900 Resurfacing BUNDLED	Exempt	\$349,600,000	N
B	901 Bridge BUNDLED	Exempt	\$17,250,000	N
B	902 Transit BUNDLED	Exempt	\$122,693,109	N
B	903 Intersection BUNDLED	Exempt	\$17,825,000	N
B	905 Access Management BUNDLED	Exempt	\$11,500,000	N
B	907 TDM/TSM BUNDLED	Exempt	\$11,500,000	N
B	908 New Ferry Service - BUNDLED	Recommended for Study	\$5,750,000	N
B	1021 Rt 6A Shuttle Service	Exempt	\$2,300,000	N
B	1023 Variable Message Signs	Exempt	\$430,000	Y-1999 (CMAQ)
B	1024 Permanent Traffic Counting Stations	Exempt	\$103,000	N
B	1027 Safety Improvements Rt 6	Exempt	\$12,000,000	N
B	1030 Land Conservation	Exempt	\$11,500,000	N

Operating and Maintenance Sub-total = \$562 Million

Total Financial Needs = \$639 Million

II. Total Available Funds

<u>Source</u>	<u>Funds (Millions)</u>
1. Federal and State - Transit FY 97 Allotment * 23 Years	\$56
2. Federal and State - Highway From Title 23 Funding Estimates 1998-2020, Total MPO resources x MARPA formula	\$629
Total Available Funds =	<u>\$685</u>

III. Comparison of Needs and Funds

Available funds are greater than or equal to financial needs. The plan is financially constrained.

Note: in addition to funding allocated to projects listed in the RTP, the CCMPO reserves an additional \$46 million of funding in anticipation of new projects or changes to projects. This brings total expenditures to the expected \$685 million available to the region.

6. - What's Next ?

Planning, being a continuing process, requires monitoring and reevaluation of what's going on and deciding what to do about it. This chapter describes where the Regional Transportation Plan is headed.

6.1. - Next Steps

The process of selecting projects for inclusion in the plan will continue to be improved. This means that criteria used to determine a project's benefits will become less subjective, with decisions supported by overall criteria which recognize the need for a balance of projects. Ongoing improvements to the Management Systems will integrate analyses of the region's transportation resources (such as pavement condition and road capacity) into the decision-making process.

Refinements to the Regional Transportation model will allow for more accurate analysis of key problem areas, public transit, and possibly other modes of travel such as ferries and bicycling.

6.2. - Conclusion

What Cape Cod becomes will depend heavily on the transportation and land use decisions we make today. Planning the right transportation system relies on having effective land use planning. Decision makers are responsible for implementing the right transportation system as well as ensuring that the "right" Cape Cod - i.e., land use - occurs. While the functions of individual decision makers are often focused on one or the other, but not both (i.e., transportation planning vs. land use

planning), only by working together can the success of both efforts be realized.

Projects recommended in the Regional Transportation Plan are listed in the following pages (repeated from the executive summary) and shown on Figure 6.0. Figure 6.1 summarizes the percentage of projected transportation expenditures. It is interesting to note that almost 77% of expenditures will continue toward maintaining and operating the existing transportation system.



Table 6.0 Summary of Recommended Projects

<u>Title/Description</u>	<u>Description</u>	<u>RTP Project# & Projected Cost</u>
Resurfacing BUNDLED	BUNDLED PROJECTS Roadway Resurfacing & Rehabilitation	900 \$349,600,000
Bridge BUNDLED	BUNDLED PROJECTS Bridge Replacement/Reconstruction	901 \$17,250,000
Transit BUNDLED	BUNDLED PROJECTS Transit Operating Assistance & Bus Replacement	902 \$122,693,109
Intersection BUNDLED	BUNDLED PROJECTS Intersection Improvements	903 \$17,825,000
Bicycle/Pedestrian Projects BUNDLED	BUNDLED PROJECTS - bicycle and/or pedestrian facilities and programs	904 \$5,750,000
Access Management BUNDLED	Eligible for all state and local numbered routes. Curb cut consolidation, medians, other access improvements	905 \$11,500,000
Transportation Enhancements BUNDLED	BUNDLED PROJECTS - Enhancements to the transportation system - per ISTEA	906 \$11,500,000
TDM/TSM BUNDLED	BUNDLED PROJECTS - Travel Demand Management/Transportation Systems Management projects	907 \$11,500,000
New Ferry Service - BUNDLED	BUNDLED PROJECTS - Passenger ferries connecting Cape Cod harbors	908 \$5,750,000
Regional Bike Network BUNDLED	BUNDLED PROJECTS - Regional links of bicycle trails and inter-town paths	909 \$9,150,000
Cape Cod Rail Trail Bridges	Cape Cod Rail trail bridges over Route 6 in Harwich and Orleans	1000 \$1,000,000
Hyannis Intermodal Center - ph. 1	Construction of facility for inter-city bus and rail operations with shuttles to airport & ferries, pedestrian links to downtown Hyannis.	1001 \$4,062,500
Hyannis Intermodal Center - ph. 2+	Completion of facility for inter-city bus and rail operations with shuttles to airport & ferries, pedestrian links to downtown Hyannis.	1002 \$4,062,500
Rt 28 MacArthur Boulevard Improvements*	Bourne - *Recommend MIS - - Construction of 2 new northbound lanes on Rt 28, reverse existing northbound, existing southbound becomes frontage road	1006 \$10,000,000

Table 6.0 Summary of Recommended Projects

<u>Title/Description</u>	<u>Description</u>	<u>RTP Project# & Projected Cost</u>
Rt 6 Reconfigure Interchange One	Improve westbound on-ramp near Sagamore Bridge during peak times for off-cape traffic flow	1008 \$1,150,000
Attucks Lane Extension	Barnstable - Construction of new roadway connecting Attucks Way to Old Rt 132	1011 \$2,500,000
Rt 132 Boulevard	Barnstable - Construction of 2 new lanes from Rt 6 to Bearses Way	1012 \$7,500,000
Cape Cod Rail Trail Resurface & Widen	Eastham to Dennis - Resurface and widen original rail trail to 12'	1014 \$1,000,000
Cape Cod Rail Trail Extensions	Extend Cape Cod Rail Trail to Provincetown in the north, Hyannis in the west	1015 \$4,000,000
Rt 28 Bike Accommodation - Hyannis-Dennis	Construction, marking, and signage of Bicycle facility along Route 28	1016 \$5,000,000
Rt 6A Shuttle Service	Public transit shuttle connecting villages along Route 6A from Sandwich to Orleans	1021 \$2,300,000
Transportation Management Center	Operations center to monitor traffic operations, issue real-time reports to traveling public, control variable message signs and coordinated traffic signals	1022 \$6,450,000
Variable Message Signs	Remote operated variable message signs installed along all major routes - Rt 6, Rt 28 in Bourne & Falmouth, Rt 25 Extension, Rt 3	1023 \$430,000
Permanent Traffic Counting Stations	Install permanent traffic counting stations at strategic locations Cape-wide	1024 \$103,000
Expand/enhance Exit 6 Park & Ride	Barnstable - Expansion of park&ride capacity at Interchange 6 Park & Ride. Add amenities such as bicycle lockers, indoor ticketing/waiting.	1025 \$1,000,000
Safety Improvements Rt 6	Dennis to Orleans - Implement improvements to Route 6 from Dennis to Orleans that preserve the character of the region while having a clear safety benefit	1027 \$12,000,000
Telecommuting Center	Demonstration Project - Cape Cod center w/telecommuting equipment (computers/modems/fax, etc.) to reduce trips to off-cape employment centers.	1029 \$250,000
Land Conservation	Strategic purchase of land to reduce sprawl and inefficient allocation of transportation resources	1030 \$11,500,000

Table 6.0 Summary of Recommended Projects

<u>Title/Description</u>	<u>Description</u>	<u>RTP Project# & Projected Cost</u>
Cape-wide Highway Advisory Radio	Provide travel information cape-wide via AM radio	1031 \$100,000
Cape Cod Capacity Study	Cape-wide study using methods developed for the Outer Cape & Monomoy Area Capacity Studies	1035 \$50,000
Harwich/Chatham Rail Trail Extension	Extend Cape Cod Rail Trail from Harwich to Chatham	1036 \$985,000
Rt 6 Eastham - Safety Improvements	Eliminate conflict points along Route 6	1037 \$1,200,000

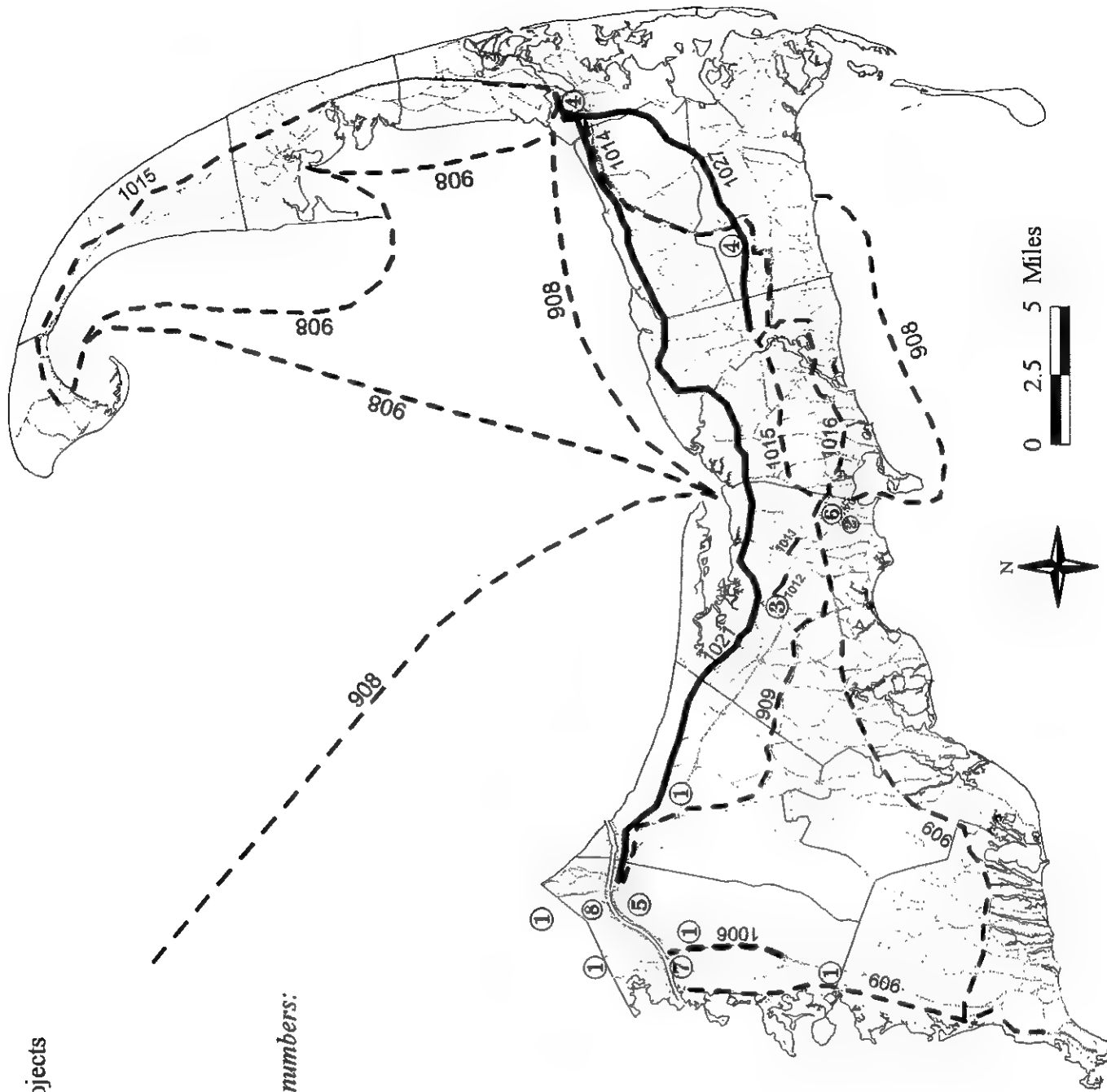
Figure 6.0 Regional Transportation Plan Projects

Corridor Projects are labelled with project numbers:

- 908: Marine Transportation Study
- 909: Regional Bicycle Network
- 1006: MacArthur Boulevard MIS
- 1011: Attucks Way Extension
- 1012: Route 132 Boulevard
- 1014: Cape Cod Rail Trail Improvements
- 1015: Cape Cod Rail Trail Extensions
- 1016: Route 28 Bicycle Accommodation
- 1021: Old Kings Highway Shuttle
- 1027: Route 6 Safety Improvements

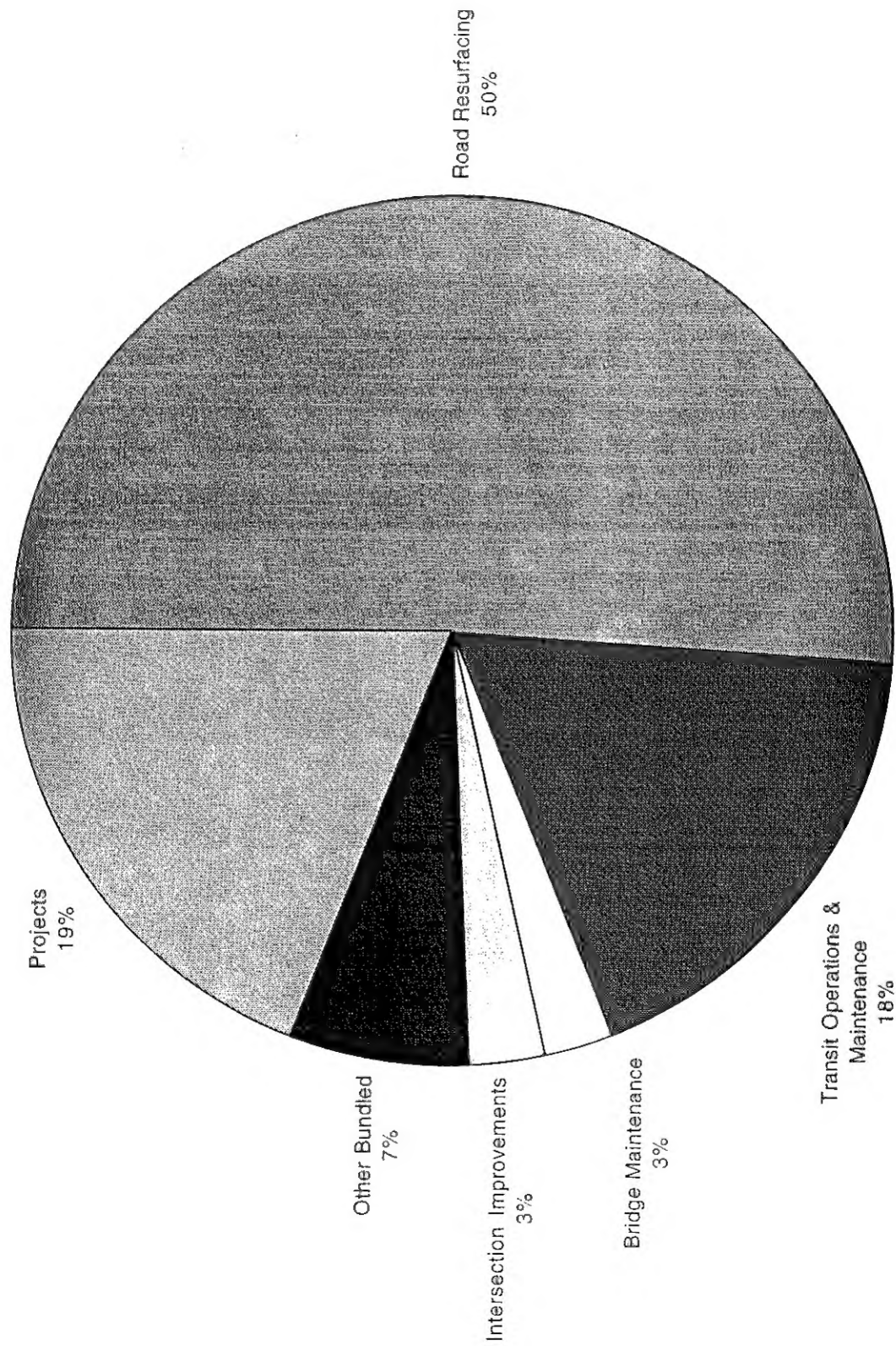
Site-Specific Projects are marked with numbered circles as follows:

- ① 1023: Variable Message Signs
- ② 1022: Transportation Management Center
- ③ 1025: Expand Exit 6 Park and Ride
- ④ 1000: Cape Cod Rail Trail Bridges
- ⑤ 1008: Reconfigure Exit 1
- ⑥ 1001/1002: Hyannis Intermodal Center
- ⑦ 1010: Bourne Rotary Study
- ⑧ 1009: Sagamore Rotary Study



Many corridors and locations shown on this map are approximate and chosen for illustrative purposes only. This map does not include projects that are not location-specific. Projects listed in the Long Range Transportation Plan must also be listed in a Transportation Improvement Program in order to receive state or federal funding. Projects may also require review by the Cape Cod Commission under the Regional Policy Plan.

Figure 6.1 - Projected Transportation Expenditures



ABBREVIATIONS

AASHTO	American Association of State Highway and Transportation Officials
ARC	Available Reserve Capacity
BTP&D	(Massachusetts) Bureau of Transportation Planning and Development
CAAA	Clean Air Act Amendments of 1990
CCC	Cape Cod Commission
CCJTC	Cape Cod Joint Transportation Committee
CCRTA	Cape Cod Regional Transit Authority
CMAQ	Congestion Mitigation and Air Quality Improvement Program
CO	Carbon Monoxide
CTPS	Central Transportation Planning Staff
DEP	Department of Environmental Protection
DOT	United States Department of Transportation
DRI	Development of Regional Impact
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EOEA	(Massachusetts) Executive Office of Environmental Affairs
EOTC	(Massachusetts) Executive Office of Transportation and Construction
EPA	Environmental Protection Agency
ESC	Enhancements Steering Committee
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
FY	Fiscal Year
GPS	Global Positioning System
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991
ITC	Intermodal Transportation Center
ITE	Institute of Transportation Engineers
ITS	Intelligent Transportation System
LOS	Level of Service
LRTP	Long Range Transportation Plan
MEPA	Massachusetts Environmental Protection Act
MHD	Massachusetts Highway Department
MPO	Metropolitan Planning Organization
NAAQS	National Ambient Air Quality Standards
NFA	Non Federal Aid
NHS	National Highway System
NO _x	Nitrogen Oxides
PPP	Public Participation Process
RPA	Regional Planning Agency
RPP	Regional Policy Plan
RTA	Regional Transit Authority
SIP	State Implementation Plan
SOV	Single Occupancy Vehicle
STIP	Statewide Transportation Improvement Program
STP	Surface Transportation Program

TAZ	Traffic Analysis Zone
TDM	Travel Demand Management
TIP	Transportation Improvement Program
TSM	Transportation Systems Management
USGS	United States Geographical Survey
v/c	Volume to Capacity
VMT	Vehicle Miles Traveled
VPD	Vehicles Per Day
VPH	Vehicles Per Hour

Massachusetts Planning Agencies:

BCRPC	Berkshire County Regional Planning Commission
CCC	Cape Cod Commission
CMRPC	Central Massachusetts Regional Planning Commission
FCPC	Franklin County Planning Commission
MVC	Marthas Vineyard Commission
MVPC	Merrimack Valley Planning Commission
MAPC	Metropolitan Area Planning Commission (Boston)
MRPC	Montachusett Regional Planning Commission
NPEDC	Nantucket Planning & Economic Development Commission
NMCOG	Northern Middlesex Council of Governments
OCPC	Old Colony Planning Council
PVPC	Pioneer Valley Planning Commission
SRPEDD	Southeast Regional Planning & Economic Development District

